# INTEGRATING ARTIFICIAL NEURAL NETWORKS AND CONSTRAINT LOGIC PROGRAMMING


By

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# Abstract

Many real-life problems, such as scene labeling, resource allocation, planning and scheduling, belong to the class of constraint satisfaction problems (CSP's). CSP's are NP-complete, and some NP-hard, in general. When the problem size grows, it becomes difficult to *program* solutions and to *execute* the solution in a timely manner. In this thesis, we present a general framework for integrating artificial neural networks (ANN) and constraint logic programming to provide an efficient and yet easy-to-program environment for solving CSP's. This framework is realized in a novel programming language PROCLANN. Operationally, PROCLANN uses the standard goal reduction strategy in its frontend to generate constraints and an efficient backend ANN-based constraint-solver. PROCLANN retains the simple and elegant declarative semantics of constraint logic programming. Its operational semantics is probabilistic in nature. We show that PROCLANN is sound and *weak complete*. A novelty of PROCLANN is that while it is a committed-choice language, PROCLANN supports non-determinism, allowing the generation of more than one answer to a query. An initial prototype implementation of PROCLANN is constructed and provides empirical evidence that PROCLANN out-performs the state of art in implementation of CLP on certain hard instances of CSP's.

# Contents

# Chapter 1

# Introduction and Summary

## 1.1 The Task

The research reported in this thesis originates as an attempt to solve *efficiently constraint satisfaction problems* (CSP's). A CSP, as defined in the sense of Mackworth [33], is described as follows:

> We are given a set of variables, a domain of possible values for each variable, and a conjunction of constraints. Each constraint is a relation defined over a subset of the variables, limiting the combination of values that the variables in this subset can take. The goal is to find a *consistent* assignment of values to the variables so that all the constraints are satisfied simultaneously.

CSP's represents a mathematical abstraction for a class of basic problems which is important in artificial intelligence, operations research and computer science in general. These general problems occur in all walks of industrial applications such as scene labeling, resource allocation, planning and scheduling, just to name a few. Most of these problems have to be solved in a timely and efficient manner in real-life situations due to their high time costs. In the case of rescue, for example, the time cost can be measured in terms of the number of lives lost per unit time. CSP's are, in general, *NP-complete* and some are even *NP-hard* [10]. Thus, a general algorithm designed to solve any CSP will necessarily require exponential time in problem size in the worst case.

There are two concerns to handle CSP's efficiently, namely *programming* and *efficient execution*. The *programming* concern deals with the ease of programming solution(s) for any CSP in a constraint-solving system. An easy-to-program constraint-solving system shortens the time to program solution(s). The second concern focuses on the efficiency of the constraint-solver, a key component of a constraint-solving system, to find these solution(s). Obviously, an *easy-to-program* and yet *efficient* constraint-solving system will be an ultimate solution for handling CSP's *efficiently*.

## 1.2 The Thesis

### 1.2.1 Thesis

The finiteness of domains, a key feature of CSP's, leads to the idea of "constraint satisfaction as a search process in the state-space[1]" [53]. This encourages the design of search algorithms for solving some specific instances of CSP's. However, many of the proposed search procedures [5, 21] are all algorithmic in nature and

[1] A state is a symbol structure which represents subsets of potential solutions during a search. The set of all possible alternatives obtainable by executing some sequence of operations from a given state lying between the initial state and the final state of a search is the state-space.

cannot escape from the curse of NP-completeness. Van Hentenryck [53] observes that a particular algorithm seldom out-performs all the other algorithms on the whole problem class. Thus, he proposes that solving a CSP may require the combination of several techniques. Van Hentenryck regards this combination as the embodiment of consistency techniques in the framework of logic programming for handling CSP's efficiently. Since there are more ear-marking results emerged from the *randomized* or *probabilistic* algorithms in some large-scale or hard instances of CSP's [20, 22, 45], we adopt a different view in this thesis. Here, we visualize the combination as the integration of artificial neural networks (ANN) and constraint logic programming (CLP). The key idea is to introduce ANN-based constraint-solver into the framework of logic programming to provide an *easy-to-program* and yet *efficient* constraint-solving system.

### 1.2.2 Antithesis

Different approaches have been proposed to address either of the concerns on handling CSP's efficiently. Examples are *numerical methods* such as linear programming, *backtracking* and *stochastic search methods* such as simulated annealing (S.A.) and artificial neural networks (ANN).

The programming concern is well addressed by *logic programming in Prolog*. The relational nature of constraints and the declarativeness of CSP's make Prolog an ideal language to specify CSP's. The basic backtracking tree-search execution strategy of Prolog, however, usually produces unacceptable performance on a computer even on medium size problems, as the tree contains too many possibilities to be exhaustively searched. Van Hentenryck [53] introduces consistency techniques [33] into logic programming so that constraints are used actively to prune search space *a priori*. This framework is realized in the CHIP language [16], which has been successfully applied to solve many industrial applications such as car sequencing [13], disjunctive scheduling, graph coloring, and firmware design [14], just to name a few. A full account of its applications can be found in [14, 15, 38, 53]. CHIP's execution mechanism is still based on tree search and backtracking, which are main barriers to the efficient execution of the language towards some hard or large-scale CSP's.

On the other hands, the stochastic search methods handle the second concern with relative success. Rabin [43] is one of the first to recognize the need and proposes *randomized* or *probabilistic* algorithms for concrete algorithmic problems in computer science although the idea can be traced back to Monte Carlo methods [4, 23]. Simulated annealing has been widely applied to scheduling with time-tables [2] and VLSI design [58] due to its more acceptable performance as compared to classical techniques. There has been recent interests in applying ANN to other optimization problems and CSP's. For instances, Hopfield network, the Boltzmann Machine and the elastic network have been used in the traveling salesman problems [1, 17, 25], the Tangram puzzles [30] and the N-queens problem [46] with satisfactory results. Some ANN approaches produce impressive results on different hard or large-scale CSP's due to its probabilistic nature. For example, a modified Hopfield network can solve the million-queens problem in minutes [35]. Wang and Tsang [49, 56] proposed GENET, a generic ANN model, for solving general CSP's with binary constraints. Wang and Tsang [57] also propose a cascadable VLSI design for GENET. A VLSI implementation of GENET would provide a potential speed gain in the order of $10^6$ to $10^8$ over existing CSP languages running on commercial workstations [57]. Most of these stochastic search methods are difficult to program. Therefore, there is no single approach which satisfies the two different concerns simultaneously.

### 1.2.3 Synthesis

Therefore we face a *dilemma between ease of programming and efficient execution*. To remove this dilemma, we propose to embed an ANN-based constraint-solver inside logic programming so that logic programming languages keep their elegant semantics and sound theoretical basis while being more efficient. On the opposite side, ANN, while efficient, is difficult to program. Translating a CSP into a neural network is often a tedious and error-prone task. This is where logic programming can help. This way we obtain the best of both worlds: an easy to program language with high efficiency.

Our proposed approach to integrate constraint logic programming and ANN is stated as follows: A CSP is specified as a constraint logic program. The logic programming part of the execution mechanism generates the corresponding neural work of the CSP, which is then submitted to the backend ANN-based constraint-solver for further scrutiny.

There has been other attempts [18, 44], with different motivations, in the amalgamation of logic programming and ANN. These approaches are all translational, in which a set of logical formula is translated into a neural network. Theorem proving becomes an energy minimization process. Our proposal represents a radically different approach, which aims at tight coupling of logical deduction and neural network computation. Solving CSP's with constraint logic programming is not new. Using ANN to solve CSP's is again not a new approach. But our proposal represents a radically new approach in the sense that we have proposed a new integration for putting the right ingredients, CLP and ANN, together.

## 1.3 Results

This thesis develops the idea of embedding ANN-based constraint-solver in logic programming from the theoretical framework to the design and prototype implementation of a new logic programming language and to the development of applications using the language. The main achievement of this thesis are:

1. the definition of a theoretical framework for integrating CLP and ANN [8],
2. the application of the theoretical framework to the design and the prototype implementation of a new constraint logic programming language,
3. the development of computer applications using the language to solve some binary CSP's.

## 1.4 Contributions

There are two main kinds of contribution of this thesis depending on the perspective we choose. As far as the logic programming community is concerned, we propose a new logical inference system which is based on ANN while the usual logic programming semantics is retained. It is the first logical inference system which uses ANN as the constraint-solver. Our proposal may encourage more experiments on the integration of other stochastic search techniques and logic programming to improve the performance of logic programming system.

Outside the logic programming community, the contribution of this research is to present an easy-to-program declarative language for solving CSP's using ANN. Imperative languages such as the C language can be used in programming solutions for CSP's but the burden of checking the correctness of the ANN model and handling the compilation errors, logical errors and exceptional cases in the program is laid upon programmers. Similar to other logic programming languages, programmers using our proposed language only have to concentrate their effort on specifying the CSP and formulating the problem statement into a query. The logic programming component automatically generates constraints from the query and the program, and pass the constraints to the ANN-based constraint-solver which completely handles the building of the ANN. Correctness of the answer is guaranteed by the novel semantic properties of the language but not by the intellectual ability of individual programmer. We find that our proposed constraint logic programming language demands much less programming efforts as compared to C on some tested CSP's. It is, at least, as easy-to-program as CHIP on all the tested problems. Hence, our proposal suggests a radically new approach for integrating ANN and constraint logic programming to handle CSP's efficiently.

## 1.5 Chapter Summaries

This section presents a short summary of each of the remaining chapters.

### 1.5.1 Chapter 2: An ANN-Based Constraint-Solver

Chapter 2 defines objective criteria, that is network uniqueness, soundness, probabilistic completeness and incrementality, for ANN-based constraint-solvers that can be used in our framework. Since the GENET model is adopted in our prototype, we review the GENET model and study its dynamics. We show how properties of GENET satisfy the first three criteria for the ANN-based constraint-solver. The last part of the chapter shows how GENET can be adapted to incremental execution to fulfill the last criterion for the constraint-solver.

### 1.5.2 Chapter 3: A Theoretical Framework of PROCLANN

Chapter 3 defines the theoretical framework of the proposed language, PROCLANN. We first presents the syntax and declarative semantics of the PROCLANN language. Then, we reviews the unification scheme in PROCLANN. A new inference rule, PROCLANN-IR, is defined for the PROCLANN computation model. Soundness and weak completeness results are given and the notion of probabilistic non-determinism is introduced.

### 1.5.3 Chapter 4: The Prototype Implementation

Chapter 4 presents the design and implementation of a prototype for the theoretical framework of PROCLANN described in Chapter 3. The first part of this chapter describes the overall design of the prototype to reflect the tight coupling of logical deduction and neural computation. Examples are given to explain how the theoretical framework of the logic programming language is realized in the prototype implementation. The implementation issues of the prototype are considered in the second part of the chapter.

### 1.5.4 Chapter 5: Benchmarking

Chapter 5 demonstrates the feasibility of our proposal. Computational results of the prototype for the $N$-Queens problem, graph-coloring problem and an exceptionally hard problem (EHP) are compared with a current state of art of CLP implementation, the CHIP language [9]. In particular, we observe that PROCLANN is slow on the $N$-queen problem which contains much symmetry. On the hard problems which we have tested, PROCLANN excels CHIP.

### 1.5.5 Chapter 6: Conclusion

Chapter 6 is divided into three parts. The first part of the chapter summarizes the contribution of this research from different aspects. The second part of the chapter discusses the limitations of PROCLANN. Last but not least, the third part of the chapter sheds light on future work.

# Chapter 2

# An ANN-Based Constraint-Solver

ANN is chosen as the backend constraint-solver in our proposed framework for its efficiency on some large-scale or hard instances of CSP's [3, 12, 29]. In the following, we first define notations for subsequent use in the thesis. Next we present objective criteria, namely *network uniqueness, soundness, probabilistic completeness and incrementality*, for the ANN-based constraint-solver. Any ANN model that satisfies these criteria can be used as the backend constraint-solver in our proposed framework. GENET is a general ANN for solving CSP's. We review the GENET model, study its dynamics, and show that it satisfies our criteria. GENET is adopted in our prototype implementation.

## 2.1 Notations

We denote $X_1, X_2, \cdots, X_n$ the finite domain variables, $D_1, D_2, \cdots, D_n$ the finite domains on which they take their values, and $v_1 \in D_1, v_2 \in D_2, \cdots, v_n \in D_n$ the value assignments given to variables. A *unary* constraint $C_{X_i}$ is defined over $D_i$, where $1 \leq i \leq n$. A *binary* constraint $C_{X_i X_j}$ is defined over a subset of $D_i \times D_j$ for all $1 \leq i, j \leq n$ and $i \neq j$. In all cases, we assume $C_{X_i X_j} = C_{X_j X_i}$. A *general* constraint $C_{X_{i_1} X_{i_2} \cdots X_{i_k}}$ is defined over a subset of $D_{i_1} \times D_{i_2} \times \cdots \times D_{i_k}$, where $1 \leq i_1, i_2, \cdots, i_k \leq n$. A *binary CSP* is a CSP with unary and binary constraints only. A *general CSP* is one which involves general constraints.

A *label* [50], denoted by $< X, v >$, is a variable-value pair which represents the assignment of the value $v$ to variable $X$. A *compound label* is the simultaneous assignment of values to variables. We use $(< X_1, v_1 >, < X_2, v_2 >, \cdots, < X_n, v_n >)$ to denote the compound label of assigning $v_1, v_2, \cdots, v_n$ to $X_1, X_2, \cdots, X_n$ respectively. A *k-compound label* assigns $k$ values to $k$ variables simultaneously. A *solution tuple* of a CSP with $n$ variables is a $n$-compound label for all the variables in the CSP so that all the constraints are satisfied.

## 2.2 Criteria for ANN-based Constraint-solver

In this section, we present the objective criteria for the ANN-based constraint-solver: *network uniqueness, soundness, probabilistic completeness and incrementality*. Our proposed language framework is *not tied* to any particular ANN model but the chosen model has to satisfy the following criteria:

1. **(Network Uniqueness)** Every CSP can be translated into a network in the ANN model and the network topology is *unique*.

2. **(Soundness)** Every answer generated by the neural network model must be a solution of the corresponding CSP.

3. **(Probabilistic Completeness)** If a CSP has solution $\theta$, then there exists *non-zero* probability that the corresponding neural network has $\theta$ as answer. We say that the neural network model is *probabilistically complete*.

4. **(Incrementality)** The model must be amenable to *efficient* incremental execution.

We explain the purposes for defining these criteria as follows. First, we are not aware of any method to select a network topology that is most efficient for the constraint-solver to execute when there are several representations. The *network uniqueness* property is to ensure that each CSP has a unique representation, as in the case of constraint network, in the ANN model. Second, each answer generated by the constraint-solver must be correct with respect to the corresponding CSP. Soundness of the model is essential in establishing the soundness of our proposed framework, which is an important property for logic programming system. Third, the usefulness of an ANN model is depleted if it is capable only in locating some but not all solutions of a CSP. The completeness criterion is probabilistic since ANN models are probabilistic in nature. Last but not least, adding new constraint to an existing solvable set of constraints is a primitive and frequent step in a CLP system. Thus, the model must be amendable to efficient incremental execution. Any ANN model which satisfies the four criteria can be used in our framework. We have chosen the GENET model [56, 49] in particular to demonstrate the feasibility of our proposal.

## 2.3 A Generic Neural Network: GENET

GENET [56, 49] is a generic neural network simulator designed to solve binary CSP's with finite domains. It can also be applied to solve general CSP's such as the car-sequencing problem[12]. This section describes the network structure of the GENET model for binary and general CSP's. Then, we show how GENET finds solution(s) for any solvable CSP with its network convergence procedure. Last but not least, we explain the behavior of the network convergence from an energy perspective.

### 2.3.1 Network Structure

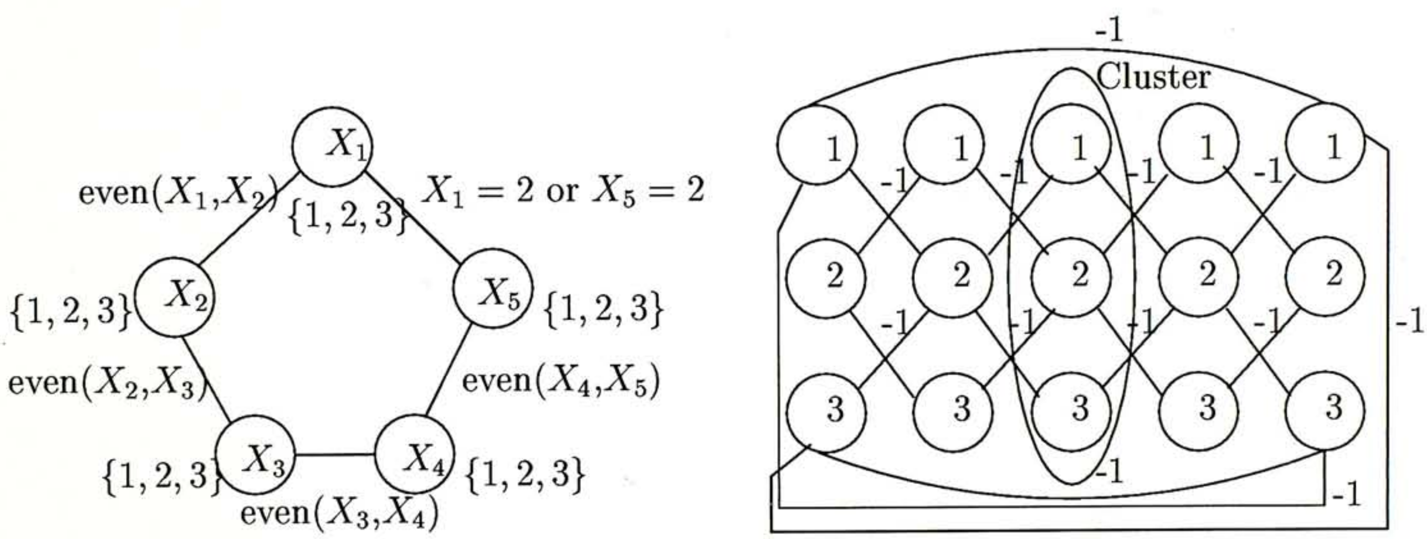
Given any binary CSP, GENET generates a connected network according to the following ways:

- Each domain variable in the CSP is represented by a collection (i.e. a cluster) of nodes.
- Each node $i$ is used to represent a value in the domain and has two attributes: state $S_i$ and input $I_i$.
- The state $S_i$ of a node $i$ is either 1 for *on* or 0 for *off*.
- Connections among the nodes are constructed according to the constraints with only inhibitory connections between incompatible nodes. The weight

of the connection between nodes $i$ and $j$ is denoted by $W_{ij}$ which is always a negative integer and initially given the value -1.

- The input to each node $i$ is a weighted sum of all its connected nodes' states, i.e. input to node $i$ is $I_i = \sum_{j=1,j\neq i}^{k} W_{ij} \times S_j$.

To illustrate how a network is constructed for a binary CSP, let us take a simple but tight[1] binary CSP as example. Assume there are five finite domain variables $X_1$ to $X_5$, all with domain $d = \{1,2,3\}$. There are two kinds of constraints: (1) $X_i + X_{i+1}$ is even and (2) either $X_1 = 2$ or $X_5 = 2$. Figure 2.1 (a) is




(a) Constraint Network of a tight CSP (b) Network Structure of the CSP

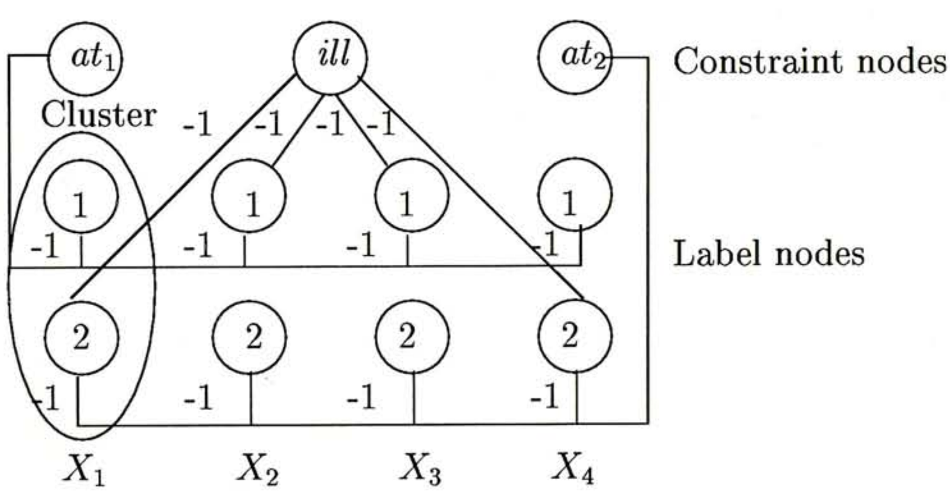
Figure 2.1: The constraint network and the GENET network of a tight CSP.

the constraint network of the example as defined in the sense of Mackworth [33]. Figure 2.1 (b) is the corresponding network topology in GENET. Each column

[1]Tightness is defined here as the number of solutions over the size of search space. A tight CSP is one which has few solutions over a large search space.

of 3 nodes represents a cluster for each domain variable. And each connection is initially set to $-1$. The cross inhibitory connections are constructed according to constraints of type (1). For example, when $X_1 = 2$ and $X_2 = 1$, their sum is 3 (odd) which violates a constraint of type (1). Thus, the second node in first column and first node in second column is connected. For constraint of type (2), consider when $X_1 = 1$, $X_5$ should then be 2. In order to fulfill this requirement, node 1 of first cluster should send inhibitory effect to the first and third node of $X_5$. The other two connections are constructed similarly.

GENET is originally designed for binary constraints. Davenport *et al.* [12] extends GENET to a multi-layered network structure to encompass special cases of general constraints, such as the *atmost* constraints [55]. In the extended model, a new class of nodes called *constraint nodes* is introduced to represent general constraints since it is impossible to represent each general constraint by binary connections only. To differentiate from constraint nodes, the nodes to represent *labels*, which are value assignments to variables, are called *label nodes*. A constraint node is connected to one or more label nodes. The connection weights between constraint nodes and label nodes are asymmetric. The weights on all connections from label nodes to constraint nodes are fixed at 1 while connection weights from constraint nodes to label nodes are initialized to $-1$ and changed after learning. Learning is activated by a constraint node to reduce the connection weights from the constraint node to the connected label nodes whenever a general constraint is violated. Figure 2.2 shows the network topology in GENET of a general CSP with one *illegal* and two *atmost* constraints. The general CSP has four finite domain variables $X_1$ to $X_4$, all with domain $D = \{1, 2\}$. The *illegal*($< X_1, 2 >, < X_2, 1 >, < X_3, 1 >, < X_4, 2 >$) constraint specifies that the compound label $L = (< X_1, 2 >, < X_2, 1 >, < X_3, 1 >, < X_4, 2 >)$ is not allowed. It is represented by the constraint node *ill* connected to the four label nodes which represents the corresponding labels in $L$. The *atmost*$(2, \{X_1, X_2, X_3, X_4\}, \{1\})$ constraint specifies that no more than two variables from the set $\{X_1, X_2, X_3, X_4\}$ can take the value 1 from the singleton $\{1\}$. It is represented by the constraint node $at_1$ which is connected to the first label nodes of all the variables. Similarly, the constraint node $at_2$ represents the *atmost*$(2, \{X_1, X_2, X_3, X_4\}, \{2\})$ constraint. Only the connection weights from the constraint nodes to the label nodes are shown in the figure since the connection weights from the label nodes to the constraint nodes are always 1.




Domain variables : $X_1, X_2, X_3, X_4$
Domain of each variable : $\{1, 2\}$
Constraints : *illegal*$(< X_1, 2 >, < X_2, 1 >, < X_3, 1 >, < X_4, 2 >)$;
*atmost*$(2, \{X_1, X_2, X_3, X_4\}, \{1\})$;
*atmost*$(2, \{X_1, X_2, X_3, X_4\}, \{2\})$.

Figure 2.2: The GENET network of a general CSP

### 2.3.2 Network Convergence

In a GENET network, only one node in a cluster is on at any moment. We say that the variable as represented by the cluster is *assigned* the value as represented by the label of the on-node. A *network state* is defined as an assignment of values to each of the clusters (variables). A solution state is a consistent assignment of values to the variables so that none of the constraints are violated. Dynamics of GENET concerns how the network changes states and connection weights before it reaches the solution state(s). The GENET network convergence procedure is defined as pseudo-code in algorithm 1.

Figure 2.4 illustrates the state update rule and heuristic learning rule of GENET using the tight binary CSP shown in Figure 2.1. Figure 2.4(a) shows a state transition from state 1 to state 2 using the state update rule. In the first cluster, nodes 2 and 3 have the same input. One of them is selected on at random in state 2. In this example, node 2 is chosen. In clusters 2, 3 and 4, all nodes share the same input. The ones that are already on remains on in state 2. In the fifth cluster, node 2 has the largest input and it becomes on in state 2. The input of each node in state 2 is re-computed accordingly. State 1 of figure 2.4(b) is trapped in a local maxima. The only on-nodes being connected are node 3 of cluster 2 and node 2 of cluster 3. The heuristic learning rule penalizes this connection by decreasing its weight by 1. The input of each node is re-computed after the weight update. The stability of the network is thus destroyed, enabling further state update.

The definition of network convergence procedure also applies to general CSP's. The input and the connection weight of a constraint node are defined as follows. Let $c$ be a constraint node and $L$ be the set of label nodes connected to

Initially one node in each cluster is randomly selected to be on.

**while** (the input to all on-nodes is non-zero) **do**

- Every node $i$ calculates its input $I_i$. In each cluster, the node with the maximum input will be turned on. To avoid chaotic or cyclic wandering of network states, if there are several nodes with maximum inputs, *the node that is already on will remain on.* Otherwise, GENET selects randomly one out of them. This step is called the *state update rule*. Apply the state update rule until all on-nodes remain unchanged.
- When the network settles in a stable state (i.e. with all on-nodes unchanged after the application of state update rule), GENET checks to see if all the on-nodes have zero input. If so, the state represent a *solution* to the CSP and the simulator *halts* with *success*. Otherwise, the state represents a *local maxima*.
- If the network settles in a local maxima of cluster input(s), a *heuristic learning rule* is applied to update all connection weights. Note that for binary CSP's, we use $W_{ij} := W_{ij} - S_i \times S_j$ to update all connection weights. If either of node $i$ or $j$ is not on, then either $S_i$ or $S_j$ is zero. Thus heuristic learning affects the weights of only arcs connecting two on-nodes for binary CSP's.

**endwhile**

Figure 2.3: (Algorithm 1) The GENET network convergence procedure.

$c$. Then the input $I_c$ of the constraint node $c$ is, in general, the *unweighted sum* of the outputs $V_i$ of these connected nodes:

$$I_c = \sum_{i \in L} V_i$$

Accordingly, the input to label node $i$ in network with a set $C$ of general constraints is defined as follows:

$$I_i = \sum_{j \in N} W_{ij} V_{ij} + \sum_{c \in C} W_{ci} V_{ci}$$

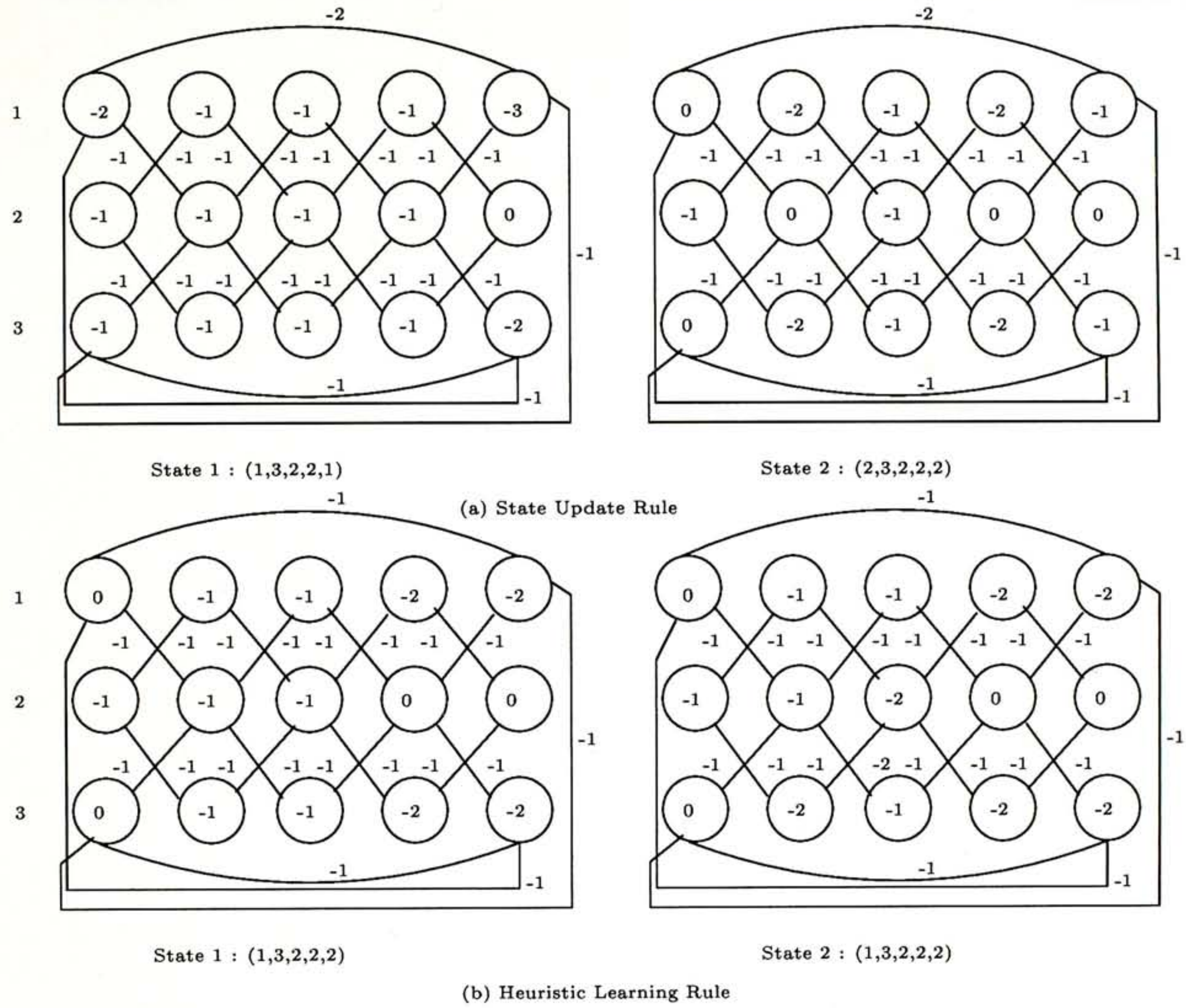



Figure 2.4: Diagrams to show the GENET network convergence

where $N$ is the set of all label nodes connected to node $i$ and $V_{ci}$ is the output of the constraint node $c$ to the label node $i$. Then, the learning mechanism for the connection weight $W_{ci}$ at time $t+1$ between constraint node $c$ and label node $i$ is given by:

$$W_{ci}^{t+1} = \begin{cases} W_{ci}^{t} - 1 & \text{if } S_c > 0 \\ W_{ci}^{t} & \text{otherwise} \end{cases}$$

where $W_{ci}^{t}$ is the connection weight at time $t$ and $S_c$ is the state of the constraint node $c$. Hence, learning is activated whenever the state of a constraint node is positive, which means a general constraint is violated.

Computations for the state and output of a constraint node are different for different types of general constraints. For instance, the definition of state $S_{ill}$ and output $V_{ill}$ of a constraint node *ill* to a label node $i$ for an *illegal*($< X_1, v_1 >$ $\cdots < X_k, v_k >$) constraint are given as follows:

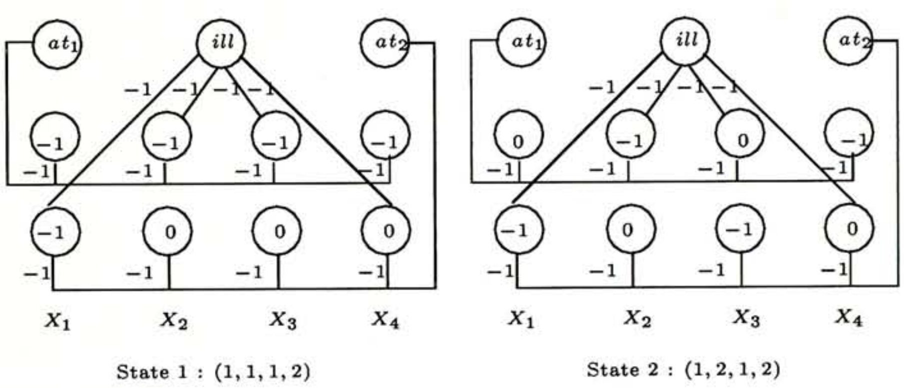
$$\begin{aligned} S_{ill} &= I_{ill} - (k-1) \\ V_{ill} &= \begin{cases} 0 & \text{if } S_{ill} < 0 \\ 1 + S_{ill} - V_i & \text{otherwise} \end{cases} \end{aligned}$$

where $k$ is the number of label nodes connected to constraint node *ill* and $V_i$ is the output of the label node $i$. For an *atmost*($N$, $Var$, $Var$) constraint, the state $S_{atm}$ and output $V_{atm}$ of a constraint node *atm* to the label nodes in the cluster $i$ are defined in the following way:

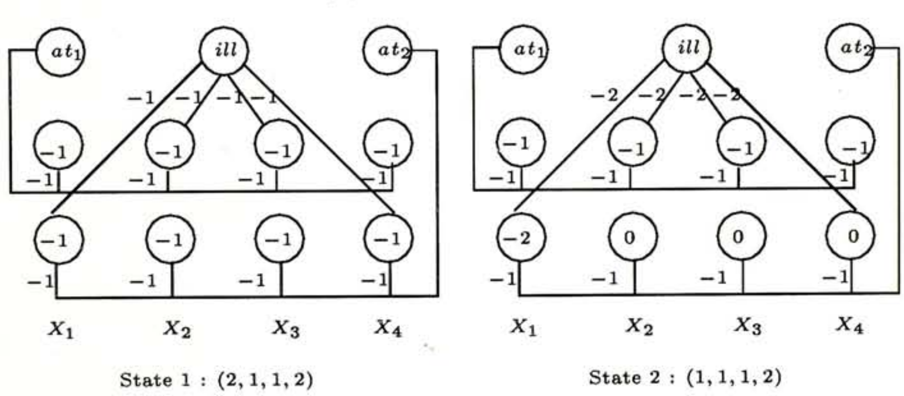
$$\begin{aligned} S_{atm} &= I_{atm} - N \\ V_{atm} &= \begin{cases} 0 & \text{if } S_{atm} < 0 \\ 1 - MaxV_i & \text{if } S_{atm} = 0 \\ 1 & \text{otherwise} \end{cases} \end{aligned}$$

where $N$ is the largest number of variables from the set $Var$ of variables that can take values from the domain $Val$ and $MaxV_i$ is the maximum output of all the label nodes which represent labels within the domain $Val$ in the cluster $i$.

Figure 2.5 illustrates how the *state update rule* and *heuristic learning rule* of GENET work for the general CSP given in section 2.3.1. Figure 2.5 (a) shows the initial value assignment violates the *atmost*$(2, \{X_1, X_2, X_3, X_4\}, \{1\})$ constraint. The $at_1$ constraint node penalizes the first label nodes of all the clusters. Thus, the state update rule selects the second label node in the second




(a) State Update Rule




(b) Heuristic Learning Rule

Figure 2.5: The GENET network convergence for a general CSP

cluster since it has a higher input. Figure 2.5 (b) demonstrates how the heuristic learning rule helps the GENET network to escape from the local maxima. The heuristic learning rule decreases the connection weights between the constraint node *ill* and its connected label nodes by 1. This decreases the inputs of the on-nodes, thus destroy the stability of the current state. Then, the state update rule chooses the first label node in the first cluster. Hence, the GENET network escapes from the local maxima.

### 2.3.3 Energy Perspective

We can understand the network convergence procedure from an energy maximization perspective. Let $N(S)$ be the set of on-nodes of state $S$. We define the *energy* of state $S$ by

$$E(S) = \sum_{i \in N(S)} I_i.$$

For binary CSP's,

$$E(S) = \sum_{i \in N(S)} \sum_{j \in C_i} W_{ij} \times S_j$$

where $C_i$ is the set of all nodes connected to node $i$.

The energy $E(S)$ of a state $S$ is the sum of all on-nodes' inputs which is a non-positive quantity since (1) the initial weights are negative and (2) the heuristic learning rule only decreases the weights. In each iteration of the **while** loop in algorithm 1 for the GENET network convergence procedure, the state update rule chooses a node with maximum input from within a cluster. In general the energy of the new state is higher than that of the old one. At worst, the energy remains the same. The maximum possible energy is zero, which happens only when all on-nodes' inputs are zero. That means that no two on-nodes are connected to each other for binary CSP's. Since only incompatible nodes are connected for binary constraints, a zero-energy state represents a solution. For general CSP's, a zero-energy state means that no on-node is inhibited by any constraint node of the general constraints. Hence, a zero-energy state also means a solution. Therefore, GENET works by maximizing the energy of the network. A network may be trapped in a local maxima, whose energy is less than zero. In this case, the heuristic learning rule will be applied to alter the weight of the arcs. The net effect of the alteration is that the energy of the current state is lowered with respect to its neighboring state, thereby destroying the current state's local maximality.

## 2.4 Properties of GENET

GENET satisfies the first three criteria, *network uniqueness, soundness* and *probabilistic completeness* for the ANN-based constraint-solver in the theoretical framework. Also, it can be adapted to incremental execution. Hence, we adopt the GENET model as the constraint-solver in our prototype to demonstrate the feasibility of our proposal. We show how properties of GENET satisfy these criteria in the following.

The construction of the network structure in GENET satisfies the network uniqueness criterion by definition. The success criterion of GENET guarantees soundness.

**Theorem 2.4.1**: (Soundness of GENET) If the GENET network of a CSP $P$ settles in a solution state $S$, then the value assignment $\theta$ corresponding to $S$ is a solution of $P$.

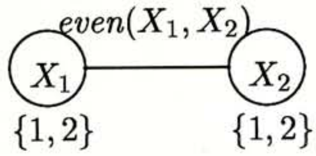
**Proof:** A GENET network settles in a solution state when all on-nodes have zero input. The network is in zero-energy state. A zero-energy state means that *no two* on-nodes are connected and no on-node is inhibited by any constraint node if it exists. Thus, the value assignment to each cluster (variable) cause no violation of constraints in the network, and represents a solution to the CSP in consideration. ■

GENET satisfies the probabilistic completeness criterion trivially.

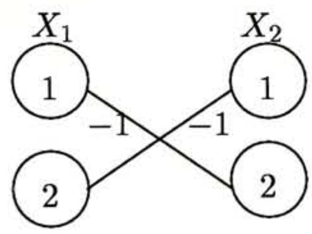
**Theorem 2.4.2**: (Probabilistic Completeness of GENET) Assume that the randomizer is fair. If $\theta$ is a solution of a CSP $P$, then there exists non-zero probability that GENET will settle in a solution state that corresponds to $\theta$. ■

**Proof:** The network convergence procedure of GENET is probabilistic in nature. The first step in the network convergence procedure is to *randomly select* an on-node in each cluster. As we assume the randomizer is fair, there is non-zero probability that the GENET network will settle in any possible network state as its initial state. Thus, there is non-zero probability that GENET will settle in any solution state of a CSP $P$ by the initial random selection. ■

The probabilistic completeness property of GENET only guarantees a non-zero probability to find every solution of a CSP. If GENET, a probabilistic simulator, starts with a solution state, it will terminate successfully. Otherwise, it may sometimes take a long time to converge and may even get into oscillation since the network convergence procedure, a stochastic search method with iterative improvement algorithm [31], is probabilistic in nature. The algorithm works




(a) The even constraint




(b) GENET Network of the even constraint

Figure 2.6: The constraint network and the GENET network of a binary CSP

by maximizing the input of the on-node in each individual cluster, thus minimizing the number of violated value-pairs (conflicts) according to the min-conflict heuristic [36]. Similar to the other stochastic search methods with iterative improvement algorithm, the network will eventually settle into one of the local maxima [31] if asynchronous assignments of values to the variables (state update) is assumed in the GENET network convergence procedure for each variable (cluster). There may be some occasions where the GENET network oscillates between several local maxima unless the search is guided by information from previous convergence cycles.

On the other hand, when synchronous state update is assumed in each cluster, the GENET network may oscillate in several network states of the same energy and cannot settle into one of the local maxima. Thus, the network convergence procedure of GENET cannot converge within a convergence cycle. Figure 2.6(a) shows the constraint network of a binary CSP in which the GENET network may oscillate between several network states. The problem comprises two variables, $X_1$ and $X_2$, in which the domains are both $\{1, 2\}$. The *even*$(X_1, X_2)$ constraint requires the sum of $X_1$ and $X_2$ to be even. Figure 2.6(b) shows the corresponding GENET network of the binary CSP. The nodes which represent the labels $< X_1, 1 >$ and $< X_2, 2 >$ are connected in GENET since their sum is odd. Similarly, the nodes which represent the labels $< X_1, 2 >$ and $< X_2, 1 >$ are connected. Assume the GENET network is initialized to represent the labels $< X_1, 1 >$ and $< X_2, 2 >$. The inputs to both on-nodes are $-1$ and inputs to the remaining nodes are 0. When both clusters change states simultaneously all the time, the network will then oscillate between the states which represent $(< X_1, 1 >, < X_2, 2 >)$ and $(< X_1, 2 >, < X_2, 1 >)$ and never converge within a convergence cycle. But if we assume asynchronous state update to each cluster (variable) of the GENET network in the network convergence procedure, oscillation between network states can be avoided, and the network will eventually settle into a solution state by the state update rule and heuristic learning rule.

Similar to the other iterative improvement algorithms, the network convergence procedure is imposed with limit on the resource such as memory or CPU time consumed by the algorithm since the GENET network may take a long time to converge or oscillate between several local maxima. In case of synchronous state update, it may not even converge due to oscillation between network states. When there is exhaustion of resource, we simply re-start the network convergence procedure for another iteration. There still exists non-zero probability that GENET will settle in any solution state of a CSP for the subsequent runs.

## 2.5 Incremental GENET

The original GENET operates in the "batch" mode: the entire network must be constructed before computation starts. In CLP systems, however, adding new constraint to an existing solvable collection is a primitive and frequent step during computation. Therefore, an efficient incremental version of GENET is necessary. We present I-GENET, a naive incremental adaptation of GENET, as pseudo-code in algorithm 2. Since the GENET network convergence procedure is part of the I-GENET procedure, the network state is randomized in each iteration of the I-GENET. Incrementality originates from the re-use of the weights of the arcs, which are computed using the heuristic learning rule and accumulated in each iteration. In other words, the network is *trained* while it is being built incrementally.

---

Initialize the network to an empty network

**while** there are more domain variables and increments of constraints to add

- Create a cluster of nodes for each additional domain variable.
- **foreach** (each pair of nodes and each constraint in the increment) **do**
  **if** the values denoted by the pair of nodes violates the constraint
  **then**
  Create an arc between the nodes and set its weight to $-1$
  **endforeach**
- Execute the network convergence procedure of GENET until success.

**endwhile**

Figure 2.7: (Algorithm 2) The I-GENET network convergence procedure.

---

Before we construct incremental GENET, we have in fact modified the way node inputs are calculated. The inputs of all nodes are calculated in each convergence cycle of the original GENET model. In the modified version, we calculate the inputs of only the nodes whose neighboring nodes change state. This modification is implemented in the modified GENET and I-GENET. We compare the original GENET, the modified GENET and the I-GENET on the N-Queens problem in figure 2.8. The graphs were generated by executing the three versions

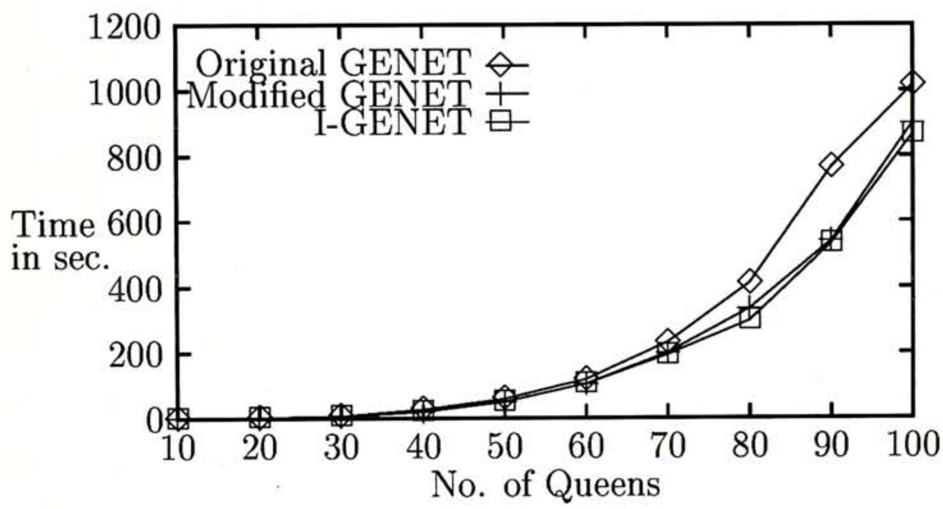



Figure 2.8: Comparison of GENET, Modified GENET and I-GENET.

of GENET on 10- to 100-Queens on a SUN SPARCstation 10 model 30. For each test case, the measurement recorded is an average over ten runs. The modified GENET shows a speedup over GENET on the $N$-Queens problem. The result also shows that I-GENET is *at least as efficient* as the modified GENET on the tested problems. Thus, we show empirically that GENET *can be adapted to satisfy* the incrementality criterion.

# Chapter 3

# A Theoretical Framework of PROCLANN

In this chapter, we describe **PRO**gramming in **C**onstraint **L**ogic with **A**rtificial **N**eural **N**etwork (PROCLANN), which is a CLP language for handling constraints over finite domains. PROCLANN features a tight coupling of logical deduction and neural computation. PROCLANN is a committed-choice language. The operational semantics of PROCLANN is to that of the CLP scheme [26, 27] but the use of an ANN-based constraint-solver is made explicit in the *PROCLANN Computation Model.* PROCLANN is both *sound* and *weakly complete.* Although it is a committed-choice language, PROCLANN supports the notion of *probabilistic non-determinism,* allowing the generation of multiple answers to a query.

## 3.1 Syntax and Declarative Semantics

Since we are interested in CSP, we need the notion of domains and domain variables [53], abbreviated as *d-variables*. A *domain* is a non-empty finite set of constants. Each d-variable has the form $X^D$, where $D$ is the associated domain of $X^D$. To differentiate d-variables from Herbrand variables [32], we call the latter *h-variables*. We refer to h-variables and d-variables as *variables*.

A PROCLANN term is the same as a CHIP term [53]. The constraint domain $\mathcal{D}$ in consideration defines a set $\mathcal{C}$ of *primitive constraints*. As specified in the CLP scheme [26, 27], the equality constraint **#=** is included in $\mathcal{C}$. An *atom* is any standard well-formed formula whose predicate symbol is different from those of the primitive constraints. A *clause* in PROCLANN has the form

$$H \text{ :- } \vec{G} \mid \vec{C}, B_1, \ldots, B_n. \quad (n \geq 0)$$

where

1. $H$ (the *head*) is an atom, $\vec{G}$ (the *guard*) is a conjunction, possibly empty, of built-in test predicates (such as $X > Y, X \leq Y$), $\vec{C}$ (the *constraints*) is a conjunction, possibly empty, of primitive constraints, and $B_1, \ldots, B_n$ (the *body*) is a conjunction, possibly empty, of atoms;

2. $\vec{G}$ contains no d-variables;

3. $\vec{C}$ contains only d-variables and ground terms;

The ":-" symbol is read as *if*, and the commas and the "|" symbol are read as conjunction. If a clause has no guard, the "|" can be omitted. Thus a clause has the same declarative reading as a Horn clause with domain variables [53].

A *program* is a finite set of clauses. A *query* in PROCLANN is simply a clause without the head and the guard. The concepts of truth, model, and logical consequences of PROCLANN are equivalent to those of CHIP [53]. We conclude

```
nqueen(N,L) :- length(L,N), L in 1..N, constraint(L).

length([],0).
length([H|T],N) :- N > 0 | N1 is N-1, length(T,N1).

constraint([]).
constraint([X|Y]) :- safe(X,Y,1), constraint(Y).

safe(X,[],Nb).
safe(X,[H|T],Nb) :- noattack(X,H,Nb), Newnb is Nb + 1,
safe(X,T,Newnb).

noattack(X,Y,Nb) :- X #\= Y, X #\= Y+Nb, Y #\= X+Nb.
```

Figure 3.1: A PROCLANN program for the N-Queens problem.

our description by two PROCLANN programs. Figure 3.1 shows a PROCLANN program for the $N$-Queens problem, the task of which is to place $N$ queens onto a $N \times N$ chessboard so that no two queens attack each other. Two queens attack each other if they are on the same row, column or diagonal. The program uses one d-variable to denote the row number of a queen on a column. The built-in predicate `in/2` declares that each element of a list is a d-variable with domain specified as a list or range. The goal "`L in 1..N`" declares a list `L` of d-variables, each of which has domain $\{1, \ldots, \mathtt{N}\}$. The "`#\=`" operator stands for the disequality constraint. The `noattack/3` predicate specifies that no two queens can be on the same row or the same diagonals.

```
colorGraph(N,L,Graph) :- L in 1..N, colorVertices(Graph).

colorVertices([]).
colorVertices([[X,Nbs]|Vts]) :- checkNbs(X,Nbs),
                                colorVertices(Vts).

checkNbs(_,[]).
checkNbs(X,[Nb|Nbs]) :- X #\= Nb, checkNbs(X,Nbs).

testGraph(N,L) :- graph(L,Graph), colorGraph(N,L,Graph).
```

Figure 3.2: A PROCLANN program for the graph-coloring problem.

Figure 3.2 contains a PROCLANN program for the graph-coloring problem, the task of which is to color all nodes in a graph, possibly non-planar, so that no two connected nodes share the same color. An example graph is shown in

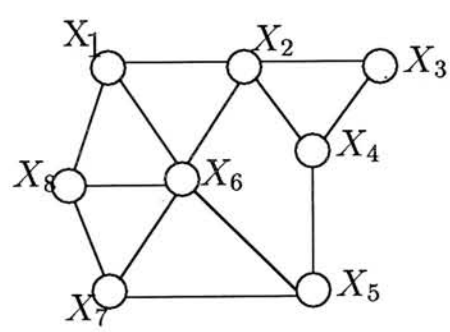



Figure 3.3: An example graph.

figure 3.3. The graph is encoded in the graph/2 predicate as follows:

```
graph([X1,X2,X3,X4,X5,X6,X7,X8],[[X1,[X2,X6,X8]]
      [X2,[X1,X3,X4,X6]],[X3,[X2,X4]],[X4,[X2,X3,X5]],
      [X5,[X4,X6,X7]],[X6,[X1,X2,X5,X7,X8]],
```

```
    [X7,[X5,X6,x8]],[X8,[X1,X6,X7]]]).
```

The first argument of the `graph/2` predicate is a list `[X1,X2,X3,X4,X5,X6,X7,X8]`, each element of which is declared as a d-variable denoting a node in the graph. The second argument is a list `Graph` of adjacency lists. Each adjacency list specifies a node $N$ followed by a list of nodes adjacent to $N$ in the graph. The `colorVertices/1` predicate takes an adjacency list "`[N,L]`" and specifies the corresponding disequality constraints between `N` and the elements of `L`. The `checkNbs/2` predicate states the disequation "`X #\= Nb`" if two nodes, `X` and `Nb`, are adjacent to each other in the graph. The `colorGraph/3` predicate labels each d-variable in `L` with `N` colors according to the list `Graph` specified in the `graph/2` predicate. The $N$-Queens program and the graph-coloring program are almost identical to the corresponding CHIP counterpart [9], except that there is no need to perform explicit labeling operation using the CHIP `indomain/1` predicate [54].

## 3.2 Unification in PROCLANN

Since PROCLANN and CHIP both handle constraints over finite-domain variables, the PROCLANN unification scheme is an adaptation of the $d$-unification scheme in CHIP [53]. A substitution for the h-variable and d-variable in the $d$-unification scheme is called *d-substitution.*

**Definition 1** A *d-substitution* $\theta$ is a finite set of the form $\{X_1/t_1, \cdots, X_n/t_n\}$ where

1. each $X_i$ is a variable;

2. each $t_i$ is a term distinct from $X_i$;

3. all the $X_i$ are distinct;

4. if $X_i$ is a d-variable $X^e$, $t_i$ is a constant included in $e$ or is a d-variable $X^l$ with $l \subset e$.

Each element $X_i/t_i$ is called a binding for $X_i$. $\theta$ is called a *ground substitution* if the $t_i$'s are all ground terms. An *expression* is either a term, a literal, or a conjunction or disjunction of literals. A *simple expression* is either a term or an atom. We denote the identity substitution by $\xi$ with which $E\xi = E$ for all expression $E$. The definitions of composition, domain and co-domain of $d$-substitutions and the most general $d$-unifier are given in the following.

**Definition 2** Let $\theta = \{u_1/s_1, \cdots, u_m/s_m\}$ and $\sigma = \{v_1/t_1, \cdots, v_n/t_n\}$ be $d$-substitutions. Then the composition $\theta\sigma$ of $\theta$ and $\sigma$ is the d-substitution obtained from the set

$$\{u_1/s_1\sigma, \cdots, u_m/s_m\sigma, v_1/t_1, \cdots, v_n/t_n\}$$

by deleting any binding $u_i/s_i\sigma$ for which $u_i = s_i\sigma$ and deleting any binding $v_j/t_j$ for which $v_j \in \{u_1, \cdots, u_m\}$.

**Definition 3** Let $\theta$ and $\sigma$ be $d$-substitutions, $W$ and $V$ be expressions and $W \subset V$. $\sigma$ is an instance of $\theta$ and $\theta$ is more general than $\sigma$ on $W$, denoted by $\sigma \geq \theta\,[W]$ iff there exists a $d$-substitution $\delta$ satisfying $\sigma = \theta\delta\,[W]$.

**Definition 4** Let $\theta$ be a $d$-substitution. $V$ be the set of variable in the expressions. The *domain* of a substitution, denoted dom($\theta$) is defined as $\{x \in V | x\theta \neq x\}$. The *codomain* of a substitution, denoted codom($\theta$) is defined as $\{x\theta | x\theta \neq x\}$. Also, the set of variables in the expression $T$ is denoted var($T$).

**Definition 5** Let $S = \{s_1, \cdots, s_n\}$ be a finite set of simple expressions. A $d$-substitution $\theta$ is called a $d$-unifier for $S$ iff $s_1\theta = \cdots = s_n\theta$. A $d$-unifier $\theta$ for $S$ is called a *most general unifier* (mgu) for $S$ iff for each $d$-unifier $\sigma$ of $S$, $\sigma \geq \theta\,[\text{var}(S)]$.

The unification scheme in PROCLANN is an adaptation of d-unification [54]. As in d-unification, we have three cases to consider in addition to the conventional unification scheme [34].

1. If a h-variable $X$ is unified with a d-variable $Y^e$, unification succeeds and the binding $\{X/Y^e\}$ is generated.

2. If two d-variables $X^d$ and $Y^e$ are unified, unification succeeds if $d \cap e \neq \emptyset$ and the binding $\{X^d/Y^e\}$ is generated.

3. If a d-variable $X^d$ is unified with a constant $c$, unification succeeds if $c \in d$ and the binding $\{X^d/Y^{\{c\}}\}$ is generated.

A PROCLANN computation can be viewed as an interleave of deduction and neural computation. The former produces bindings for the h-variables while the latter produces bindings for the d-variables. Accordingly, we partition the $d$-substitution into two parts: the *$\alpha$-substitution* which is the $d$-substitution restricted to the h-variables and the *$\beta$-substitution* which is the $d$-substitution restricted to the d-variables. The $\alpha$- and $\beta$-substitutions are special cases of the $d$-substitution. Hence, the notion of composition, domain and codomain of $\alpha$- and $\beta$-substitutions follow those of $d$-substitution. The definitions of most general unifier is extended to $\alpha$- and $\beta$-substitutions.

**Definition 6** Let $S = \{s_1, \cdots, s_n\}$ be a finite set of simple expressions. A $\alpha$-substitution $\vartheta$ is called a $\alpha$-unifier if and only if there exists a $d$-unifier $\theta$ for $S$ and $\vartheta$ contains the set of bindings for all the h-variables in $\theta$. A $\alpha$-unifier $\vartheta$ is called a *most general $\alpha$-unifier* if and only if there exists a most general $d$-unifier $\sigma$ for $S$ and $\vartheta$ contains the set of bindings for all the h-variables in $\sigma$.

**Definition 7** Let $S = \{s_1, \cdots, s_n\}$ be a finite set of simple expressions. A $\beta$-substitution $\varepsilon$ is called $\beta$-unifier if and only if there exists a $d$-unifier $\theta$ for $S$ and $\varepsilon$ contains the set of bindings for all the d-variables in $\theta$. A $\beta$-unifier $\varepsilon$ is called a *most general $\beta$-unifier* if and only if there exists a most general $d$-unifier $\sigma$ for $S$ and $\varepsilon$ is the set of bindings for all the d-variables in $\sigma$.

Accordingly, we define two *unifiable expressions* as follows:

**Definition 8** Let $H$ and $S$ be simple expressions. $H$ is *unifiable* with $S$ if there exists a most general $\alpha$-unifier and a most general $\beta$-unifier for $H$ and $S$.

The bindings generated from case (2) and (3) are composed to form the $\beta$-substitution for the $d$-variables. Since the bindings in the $\beta$-substitution are meant to be consumed by the ANN-based constraint-solver of PROCLANN, they have to be transformed to a set of equality constraints before they are passed to the constraint-solver. The following definition shows the transformation of a $\beta$-substutition to a set of *equality constraints* defined in PROCLANN.

**Definition 9** A *d-replacement* $d(\varepsilon)$ of *$\beta$-substitution* $\varepsilon = \{X_1/Y_1, \cdots, X_n/Y_n\}$ is a finite set of the form $\{X_1 \texttt{ #= } Y_1, \cdots, X_n \texttt{ #= } Y_n\}$.

The set $\{X_1 \texttt{ #= } Y_1, \cdots, X_n \texttt{ #= } Y_n\}$ obtained from the $d$-replacement is then injected into the ANN-based constraint-solver for neural computation. Hence, the unification scheme in PROCLANN facilitates logical deduction and neural computation using $\alpha$- and $\beta$-substitutions.

**Definition 10** Let $S$ be a finite set of simple expressions. The *disagreement set* of $S$ is defined as follows. Locate the leftmost symbol position at which not all expression in $S$ have the same symbol, and extract from each expression in $S$ the subexpression beginning at that symbol position. The set of all such subexpressions is the disagreement set.

The PROCLANN unification algorithm can be stated explicitly in algorithm 3. The $\sigma_k$ represents the most general $d$-unifier in the $d$-unification algo-

---

1. Set $k$, $i$ and $j$ to 0; $\sigma$, $\alpha_0$ and $\beta_0$ to $\{\}$.
2. If $S\sigma_k$ is a singleton, then stop; $\alpha_i \cup \beta_j$ is the result returned by the algorithm. Otherwise find the disagreement set $D_k$ of $S\sigma_k$.
3. If there exist $v$ and $t$ in $D_k$ such that $v$ is a h-variable, then put $\alpha_{i+1} = \alpha_i\{v/t\}$, $\sigma_{k+1} = \sigma_k\{v/t\}$, increment $i$ and $k$, and go to step 2.
4. If there exist a d-variable $v^d$ and a constant $c$ in $D_k$ such that $c \in d$, then put $\beta_{j+1} = \beta_j\{v^d/x^{\{c\}}\}$, $\sigma_{k+1} = \sigma_k\{v^d/x^{\{c\}}\}$, where $x^{\{c\}}$ is a new d-variable ranging over $\{c\}$ only, increment $j$ and $k$, and go to step 2.
5. If there exist $v^d$ and $w^e$ in $D_k$ such that $d \supset e$, then put $\beta_{j+1} = \beta_j\{v^d/w^e\}$, $\sigma_{k+1} = \sigma_k\{v^d/w^e\}$, increment $j$ and $k$, and go to step 2.
6. If there exist $v^d$ and $w^e$ in $D_k$ such that $l = d \cap e \neq \emptyset$, $\beta_{j+1} = \beta_j\{v^d/z^l, w^e/z^l\}$, $\sigma_{k+1} = \sigma_k\{v^d/z^l, w^e/z^l\}$, where $z^l$ is a new d-variable ranging over $l$, increment $j$ and $k$, and go to step 2.

Figure 3.4: (Algorithm 3) The PROCLANN Unification Algorithm.

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rithm [53]. The $\alpha_i$ and $\beta_j$ are the most general $\alpha$-unifier and the most general

$\beta$-unifier generated by the PROCLANN unification algorithm respectively. Note that occur check [32] is omitted for unification of the h-variables in step 3 for better efficiency.

## 3.3 PROCLANN Computation Model

The **PROCLANN** **I**nference **R**ule (**PROCLANN-IR**) forms the core part of the PROCLANN computation model. The PROCLANN-IR is a new logical inference rule in which the use of neural network is made explicit in logical deduction while retaining the usual semantic properties of logic programming. PROCLANN-IR is defined as follows.

**Definition 11** Let $P$ be a PROCLANN program and $Q_i$ a query. $Q_{i+1}$ is *derived* from $Q_i = \leftarrow \vec{C}, B_1, \ldots, B_j, \ldots, B_q$, where $\vec{C}$ is a conjunction of primitive constraints, if the following conditions are satisfied:

1. $B_j$ is the *selected* atom in $Q_i$;
2. there exists a clause "$H$ :- $\vec{G} \mid \vec{C'}, A_1, \ldots, A_n$." ($n \geq 0$) in $P$ such that
   (a) $H$ is unifiable with $B_j$ generating most general $\alpha$-unifier $\vartheta_i$ and most general $\beta$-unifier $\varepsilon_i$, and
   (b) the execution of the guard $\vec{G}$ succeeds;
3. the corresponding neural network of $\vec{C''} = \vec{C} \cup d(\varepsilon_i) \cup \vec{C'}$ converges to a solution state in finite amount of time;
4. $Q_{i+1} = \leftarrow \vec{C''}, B_1, \ldots, B_{j-1}, A_1, \ldots, A_n, B_{j+1}, \ldots, B_q$.

**Definition 12** Let $Q$ be the initial query. A *derivation* is a, possibly infinite, sequence of queries $Q_0(= Q), Q_1, Q_2, \ldots$ such that $Q_{i+1}$ is derived from $Q_i$ generating substitution $\theta_{i+1}$.

A PROCLANN derivation may be finite or infinite. A finite derivation may be successful or failed.

**Definition 13** A derivation is *successful* if it is finite with $m$ steps and the last query contains no atoms. In this case, the constraint accumulated in the last goal is called the *answer constraint* and the associated neural network is called the *answer network*.

**Definition 14** A derivation is *failed* if it is finite, and the last query contains one or more atoms, and condition 2 of a derivation step does not hold.

**Definition 15** A PROCLANN-refutation is a successful derivation by PROCLANN-IR wih $n$ finite steps. We say the refutation has *length* $n$.

**Definition 16** An unrestricted PROCLANN-refutation is a PROCLANN-refutation, except that we drop the requirement that the substitutions $\vartheta_i$ and $\varepsilon_i$ be the most general $\alpha$-unifier and the most general $\beta$-unifier. They are only required to be $\alpha$-unifiers and $\beta$-unifier respectively.

**Definition 17** Let $P$ be a PROCLANN program. The *success set* of $P$ is the set of all the ground atoms $A$ such that there exists a PROCLANN-refutation for $P \cup \{\leftarrow A\}$.

**Definition 18** A *computed answer* of a successful derivation is the union of a solution state $\theta_N$ of the answer network $N$ and the composition of the most general $\alpha$-unifiers $\theta_h = \vartheta_1 \cdots \vartheta_m$, where $\vartheta_i$ is the most general $\alpha$-unifier generated in the $i$-th step in the derivation.

The PROCLANN refutation procedure works by searching for a PROCLANN-refutation out of many possible derivations. Note that, in a derivation step, there can be more one clause in the program that satisfies condition 2 of a derivation step. We call these clauses *candidate clauses*. The solution computed depends upon the choice of candidate clause, to which the evaluation is committed. PROCLANN does not specify which candidate clause to select if there is a choice. It relies on a *fair*[1] scheduling algorithm [19] in the underlying implementation to select and commit to a candidate clause. Thus PROCLANN does not support tree search on constraints. In addition, it is possible that PROCLANN chooses a wrong clause in a derivation step tjat leads to a failed derivation even when there exists a successful derivation for the original query. This is typical of committed-choice languages. Nevertheless, PROCLANN is sound and weakly complete.

## 3.4 Soundness and Weak Completeness of the PROCLANN Computation Model

The soundness of PROCLANN computation model follows essentially from the soundness criterion of the ANN-based constraint-solver.

**Theorem 3.4.1**: (Soundness of the PROCLANN Computation Model) Let

[1]Shapiro *et al.* [47, 48] define the notion of "stable" implementation of Concurrent Prolog and show how fairness can be controlled by the programmer. Parlog programmers do not have to rely on a stable implementation. Fairness can be programmed using the `var` primitive [6, 7]

Hence, $\forall(Q\theta)$ is a logical consequence of $P \cup \mathcal{T}$ for $n = 1$.

Next suppose the result holds for computed answer $\theta_{n-1}$ which come from a successful derivation with $n-1$ steps. Suppose $\theta_n$ is the computed answer for a successful derivation with $n$ steps. Let $A \leftarrow \vec{C'}, B_1, \cdots, B_j$ be the first input clause and $A_m$ the selected atom of query $Q$. By the induction hypothesis, $\forall((\vec{C}_{n-1} \wedge \vec{C'} \wedge A_1 \wedge \cdots \wedge A_{m-1} \wedge B_1 \wedge \cdots \wedge B_j \wedge A_{m+1} \wedge \cdots \wedge A_l)\theta_n)$ is a logical consequence of $P \cup \mathcal{T}$, where $\vec{C}_{n-1}$ is the answer constraint for a successful derivation with $n-1$ steps. Thus, if $j > 0$, $((\vec{C'} \wedge B_1 \wedge \cdots \wedge B_j)\theta_n)$ is a logical consequence of $P \cup \mathcal{T}$. Consequently, $(A\theta_n)$ is a logical consequence of $P \cup \mathcal{T}$. $\forall((\vec{C}_{n-1} \wedge \vec{C'} \wedge A_1 \wedge \cdots \wedge A_l)\theta_n)$ is a logical consequence of $P \cup \mathcal{T}$. Hence $\forall((c_1 \wedge \cdots \wedge c_k \wedge A_1 \wedge \cdots \wedge A_l)\theta)$ is a logical consequence of $P \cup \mathcal{T}$ since $\vec{C}_{n-1} \wedge \vec{C'}$ contains $c_1 \wedge \cdots \wedge c_k$. ∎

The probabilistic completeness criterion leads to the *weak completeness* result of PROCLANN-IR. We begin with two very useful lemmas.

**Lemma 3.4.2**: (Mgu Lemma) Let $P$ be a PROCLANN program and $Q$ be a query. Suppose that $P \cup \{Q\}$ has an unrestricted PROCLANN-refutation. Then $P \cup \{Q\}$ has a PROCLANN-refutation of the same length such that, if $\vartheta_1, \cdots, \vartheta_n$ are the $\alpha$-unifiers from the unrestricted PROCLANN-refutation and $\vartheta'_1, \cdots, \vartheta'_n$ are the most general $\alpha$-unifiers from the PROCLANN-refutation, then there exists a $\alpha$-substitution $\gamma$ such that $\vartheta_1, \cdots, \vartheta_n = \vartheta'_1, \cdots, \vartheta'_n\gamma$.

**Proof:** The proof is by induction on the length of the unrestricted PROCLANN-refutation. Suppose that $n = 1$. Thus $P \cup \{Q\}$ has an unrestricted refutation $Q_0 = Q, Q_1 = \square$ with input clause $H_1$ and $\alpha$-unifier $\vartheta_1$, where $\square$ stands for the empty clause. Suppose $\vartheta'_1$ is a most general $\alpha$-unifier of the atom in $Q$ and the

$P$ be a PROCLANN program, $\mathcal{T}$ be a first-order theory that axiomatizes the constraint domain $\mathcal{D}$ and $\leftarrow Q$ a query. If the query $Q$ has a successful derivation with computed answer $\theta$ by PROCLANN-IR, then

$$P \cup \mathcal{T} \models_{\mathcal{D}} \forall(Q\theta)$$

where $\forall(F)$ is the universal closure of the formula $F$.

**Proof:** Let $Q = \vec{C}, A_1, \cdots, A_l$, where $\vec{C} = c_1, \cdots, c_k$ is a conjunction of primitive constraints defined in $\mathcal{D}$ and $A_1, \cdots, A_l$ is conjunction of atoms, $\vec{C_N}$ be the answer constraint, $\theta_N$ be the solution state of the answer network $N$ and $\theta_h = \vartheta_1 \cdots \vartheta_n$ be the composition of $\alpha$-substitutions for a successful derivation. We have to show that $\forall((c_1 \wedge \cdots \wedge c_k \wedge A_1 \wedge \cdots \wedge A_l)\theta)$ is a logical consequence of $P \cup \mathcal{T}$, where $\theta = \theta_h \cup \theta_N$. The result is provable by induction on the length of the derivation.

Suppose first that $n = 1$. This means that $\leftarrow Q$ is a query of the form $\leftarrow c_1, A_1$. The program has a unit clause of the form $A \leftarrow c$ and $\vec{C_N} = c \cup c_1 \cup d(\varepsilon_1)$, where $\varepsilon_1$ is the most general $\beta$-unifier generated for the unification of $A$ and $A_1$. Since $\mathcal{T} \models_{\mathcal{D}} \forall(\vec{C_N}\theta_N)$ by the soundness of GENET as demonstrated in theorem 2.4.1 and $A_1\theta_1 = A\theta_1$,

$$P \cup \mathcal{T} \models_{\mathcal{D}} \forall((\vec{C_N}\theta_N) \wedge (A_1\theta_1))$$

Since $\vec{C_N}$ do not contain any $d$-variables, it can be re-written as follows:

$$\begin{aligned} P \cup \mathcal{T} &\models_{\mathcal{D}} \forall((\vec{C_N}(\theta_N \cup \theta_h)) \wedge (A_1\theta_1)) \\ &\models_{\mathcal{D}} \forall((\vec{C_N}\theta_1) \wedge (A_1\theta_1)) \\ &\models_{\mathcal{D}} \forall((\vec{C_N} \wedge A_1)\theta_1) \\ P \cup \mathcal{T} &\models_{\mathcal{D}} \forall((c_1 \wedge A_1)\theta_1) \text{ ( since } c_1 \in \vec{C_N}) \end{aligned}$$

head of the unit clause $H_1$. Then $\vartheta_1 = \vartheta'_1\gamma$, for some $\gamma$. Furthermore, $P \cup \{Q\}$ has a PROCLANN-refutation $Q_0 = Q, Q_1 = \Box$ with input clause $H_1$ and the most general $\alpha$-unifier $\vartheta'_1$.

Now suppose the result holds for $n-1$. Suppose $P \cup \{Q\}$ has an unrestricted refutation $Q_0 = Q, Q_1, \cdots, Q_n = \Box$ of length $n$ with input clauses $H_1, \cdots, H_n$ and $\alpha$-unifiers $\vartheta_1, \cdots, \vartheta_n$. There exists a most general $\alpha$-unifier $\vartheta'_1$ for the selected atom in $Q$ and the head of $H_1$ such that $\vartheta_1 = \vartheta'_1\rho$, for some $\rho$. Thus $P \cup \{Q\}$ has an unrestricted refutation $Q_0 = Q, Q'_1, Q_2, \cdots, Q_n = \Box$ with input clauses $H_1, \cdots, H_n$ and $\alpha$-unifiers $\vartheta'_1, \rho\vartheta_2, \vartheta_3, \cdots, \vartheta_n$, where $Q_1 = Q'_1\rho$. By the induction hypothesis, $P \cup \{Q'_1\}$ has a PROCLANN-refutation $Q'_1, Q'_2, \cdots, Q'_n = \Box$ with the most general $\alpha$-unifiers $\vartheta'_1, \cdots, \vartheta'_n$ such that $\rho\vartheta_2, \cdots, \vartheta_n = \vartheta'_2, \cdots, \vartheta'_n\gamma$, for some $\gamma$. Thus $P \cup \{Q\}$ has a refutation $Q_0 = Q, Q'_1, \cdots, Q'_n = \Box$ with the most general $\alpha$-unifiers $\vartheta'_1, \cdots, \vartheta'_n$ such that $\vartheta_1 \cdots \vartheta_n = \vartheta'_1\rho\vartheta_2 \cdots \vartheta_n = \vartheta'_1 \cdots \vartheta'_n\gamma$.

■

**Lemma 3.4.3**: (Lifting Lemma) Let $P$ be a PROCLANN program, $Q$ be a query and $\vartheta$ be a $\alpha$-substitution. Suppose that there exists a PROCLANN-refutation of $P \cup \{Q\}$ of the same length such that, if $\vartheta_1, \cdots, \vartheta_n$ are the most general $\alpha$-unifiers from the PROCLANN-refutation of $P \cup \{Q\theta\}$ and $\vartheta'_1, \cdots, \vartheta'_n$ are the most general $\alpha$-unifiers from the PROCLANN-refutation of $P \cup \{Q\}$, then there exists a $\alpha$ substitution $\gamma$ such that $\vartheta\vartheta_1 \cdots \vartheta_n = \vartheta'_1 \cdots \vartheta'_n\rho$.

**Proof:** Suppose the first input clause for the PROCLANN-refutation of $P \cup \{Q\vartheta\}$ is $H_1$, the first most general $\alpha$-unifier $\vartheta_1$ and $Q_1$ is the query which results from the first step. We may assume $\vartheta$ does not act on any variables in $H_1$. Now $\vartheta\vartheta_1$ is a $\alpha$-unifier for the head of $H_1$ and the atom in $Q$ which corresponds to the

Let $P$ be a PROCLANN program, $\mathcal{T}$ be a first-order theory that axiomatizes the constraint domain $\mathcal{D}$ and $\leftarrow Q$ a query. If $P \cup \mathcal{T} \models_{\mathcal{D}} \forall(Q\theta)$ with $\theta = \theta_N \cup \theta_h$ a substitution, where $\theta_N$ contains only bindings for d-variables and $\theta_h$ contains only bindings for h-variables, then there exist a successful derivation for $\leftarrow Q$ with answer network $N$ such that

- there is a *non-zero* probability that $N$ will converge into the solution state $\theta_N$, and
- if $\theta'_h = \vartheta'_1 \cdots \vartheta'_m$ is the composition of $\alpha$-substitutions generated in the successful derivation, then there exist $\alpha$-substitution $\sigma$ such that $\theta_h = \theta'_h\sigma$.

**Proof:** Suppose $Q$ is the query $\leftarrow A_1, \cdots, A_k$. $\forall((A_1 \wedge \cdots \wedge A_k)\theta)$ is a logical consequence of $P$. By lemma 3.4.5, there exists a refutation of $P \cup \mathcal{T} \cup \{\leftarrow A_i\theta\}$ such that the computed answer is the identity, for $i = 1, \cdots, k$. We can combine these refutations into a refutation of $P \cup \mathcal{T} \cup \{Q\theta\}$ such that the computed answer is the identity.

Suppose the sequence of the most general $\alpha$-unifier of the refutation of $P \cup \mathcal{T} \cup \{Q\theta\}$ is $\vartheta_1, \cdots, \vartheta_n$. Then $Q\theta_h\vartheta_1, \cdots, \vartheta_n = Q\theta_h$. By the lifting lemma, there exists a PROCLANN-refutation of $P \cup \mathcal{T} \cup \{Q\}$ with the most general $\alpha$-unifiers $\vartheta'_1, \cdots, \vartheta'_n$ such that $\theta_h\vartheta_1 \cdots \vartheta_n = \vartheta'_1 \cdots \vartheta'_n\sigma$, for some $\alpha$-substitution $\sigma$. Hence, $\theta_h = \theta'_h\sigma$. The answer network $N$ will have non-zero probability to converge to the solution state $\theta_N$, which is guaranteed by the the probabilistic completeness criterion of the ANN adopted in PROCLANN. ■

Theorem 3.4.6 reviews the probabilistic nature of PROCLANN to the fullest extent. It means that if the CSP specified by the program is solvable, then selected atom in $Q\vartheta$. The result of resolving $Q$ and $H_1$ using $\vartheta\vartheta_1$ is exactly $Q_1$. Thus we obtain an unrestricted PROCLANN-refutation of $P \cup \{Q\}$, which looks exactly like the given PROCLANN-refutation of $P \cup \{Q\}$, except the original query is different, of course, and the first unifier is $\vartheta\vartheta_1$. Now apply the mgu lemma. ∎

We now state the first completeness result.

**Theorem 3.4.4**: The success set of a PROCLANN program is equal to its least Herbrand model.

**Proof:** The proof is omitted here but is exactly the same as that for theorem 8.3 in Lloyd's book. The proof makes use of fixed point theory and requires the definition of several notions not introduced at here. ∎

The following lemma assists in the proof of the weak completeness result.

**Lemma 3.4.5**: Let $P$ be a PROCLANN program and $A$ an atom. Suppose that $\forall(A)$ is a logical consequence of $P$. Then there exists a PROCLANN-refutation of $P \cup \{\leftarrow A\}$ with the identity substitution as the computed answer.

**Proof:** Suppose $A$ has variables $X_1, \cdots, X_n$. Let $a_1, \cdots, a_n$ be distinct constants not appearing in $P$ or $A$ and let $\theta$ be substitution $\{X_1/a_1, \cdots, X_n/a_n\}$. Then it is clear that $A\theta$ is a logical consequence of $P$. Since $A\theta$ is ground, theorem 3.4.4 shows that $P \cup \{\leftarrow A\theta\}$ has a refutation. Since the $a_i$ do not appear in $P$ or $A$, by replacing $a_i$ by $x_i (i = 1, \cdots, n)$ in this refutation, we obtain a refutation of $P \cup \{\leftarrow A\}$ with the identity substitution as the computed answer. ∎

**Theorem 3.4.6**: (Weak Completeness of the PROCLANN Computation Model) there always exists a successful derivation and the answer network obtained has non-zero probability to converge to any solution of the CSP. Note that our completeness results are existential in the sense that we can guarantee the existence of a successful derivation but PROCLANN may not find it. This is a consequence of the committed-choice nature of PROCLANN; hence the name weak completeness.

## 3.5 Probabilistic Non-determinism

One distinguished feature of PROCLANN is that while it is a committed-choice language but yet it supports both *don't-care* and *don't-know* non-determinisms, allowing the generation of multiple answers to a query. A PROCLANN computation can be divided into two parts: network generation and solution generation. Don't-care non-determinism is exhibited in the first part, in which the program is used as a network generator using goal reduction on guarded clauses. The neural network, while being built up incrementally, is also subject to network training. A successful derivation leads to an answer network. Don't-know non-determinism originates from the second part of the execution, in which the answer network is further executed using the network convergence procedure. *As in the case of Prolog*, PROCLANN users can request answer one after another. Upon request, PROCLANN *only has to re-start the second part of the execution.* In fact, the solution generation part is relatively inexpensive with respect to the overall cost of execution since much time is spent in the construction of the network, where a form of consistency check is done. The implication is that we can generate subsequent answers at low cost. In conventional logic programming languages, the cost of getting the subsequent answers grows exponentially in general. Last but not least, answers are produced randomly; hence the name *probabilistic non-determinism.*

# Chapter 4

# The Prototype Implementation

To demonstrate the feasibility of our proposal, we have built a prototype of PROCLANN using Quintus Prolog Release 3.1 and GNU C compiler Release 2.4 on SunOS Version 4.1.3. The first section of the chapter discusses the overall design of the prototype and shows how the theoretical framework of PROCLANN can be realized in the prototype. The second section of the chapter describes and justifies the implementation details of the prototype.

## 4.1 Prototype Design

We use a Prolog system as the frontend CLP system in the prototype implementation. The backend ANN-based constraint-solver, incremental GENET (I-GENET), is implemented as a Quintus Prolog foreign C object with two interface functions: `addDomain(X,D)` and `addConstraints(L)`, where $X$ is a $d$-variable with domain $D$ represented as list and $L$ is a list of constraints in textual form. The `addDomain/2` predicate instructs I-GENET to add the d-variable $X^D$ into the network by creating a cluster of $|D|$ nodes. The goal reduction part of PROCLANN is performed naturally by Prolog. Constraints are passed to I-GENET in a derivation step via the `addConstraints/1` predicate. The following are the revised syntax of the `nqueen/2`, `noattack/3`, `colorGraph/3` and `checkNbs/2` predicates of the sample PROCLANN programs given in figures 3.1 and 3.2:

```
nqueen(N,L) :- length(L, N), addDomain(L, 1..N),
                             constraint(L).
noattack(X,Y,Nb) :- addConstraints( [X #\= Y, X #\= Y+Nb,
                             Y #\= X+Nb] ).
colorGraph(N,L,Graph) :- addDomain(L, 1..N),
                             colorVertices(Graph).
checkNbs(X,[Nb|Nbs]) :- addConstraints([ X #\= Nb ]),
                             checkNbs(X,Nbs).
```

Figure 4.1 shows the overall design for the PROCLANN prototype. User specifies the CSP at hand as a PROCLANN program and inputs the program and query into the PROCLANN prototype. Then, the frontend Prolog system executes goal reduction by *SLD-derivation* [32]. The `addDomain(X,D)` predicate instructs I-GENET to add each d-variable $X^D$ into the network by creating a cluster of $|D|$ nodes in any derivation step. Each node in the cluster represents a value in the domain $D$ of the *d*-variable $X^D$. Using the `addConstraints(L)` predicate, the frontend Prolog system can generate a list $L$ of constraints which are passed to I-GENET in a derivation step. **C"** represents the *d*-variables and the list $L$ of constraints, which is passed from the Prolog system to the constraint-solver. Upon receiving the clusters of nodes (d-variables) and constraints, the constraint-solver installs the nodes to the existing network and

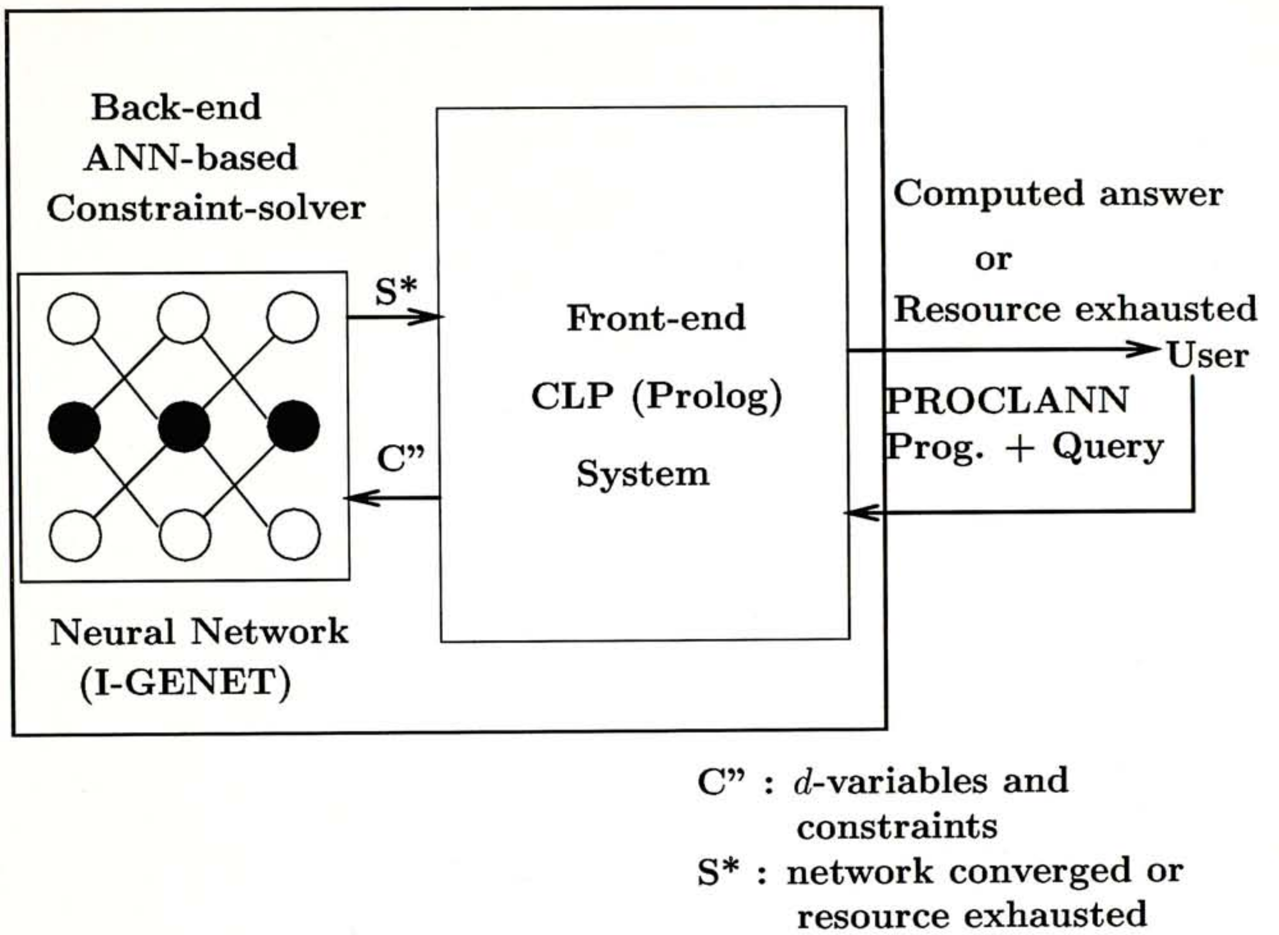


Figure 4.1: The overall design of our PROCLANN prototype

installs the inhibitory arcs between nodes according to the constraints. Taking the 5-queen problem as an example, connections between domain variables $X1$ and $X2$ for constraints in the list $L$ as { `X1 #\= X2, X1 #\= X2+1, X2 #\= X1+1` } will be constructed in the first derivation step as shown in Figure 4.2. For example, the connections between the nodes in the same row for cluster 1 and 2 are made in accordance with the constraint "`X1 #\= X2`". The cross connections between the two clusters of nodes are made according to the other two constraints.

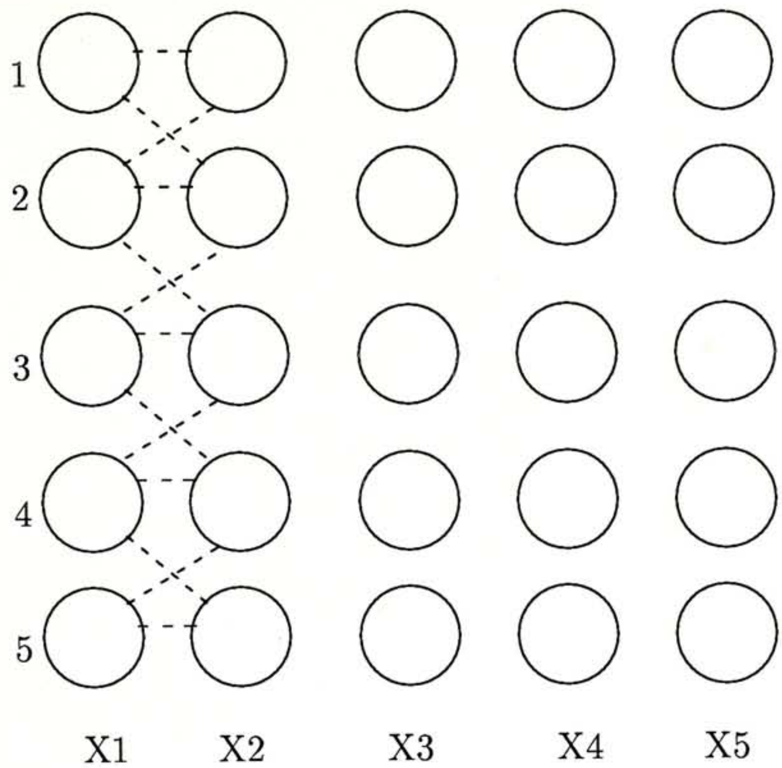


Figure 4.2: A partially constructed I-GENET network for the 5-queen problem.

The ANN-based constraint-solver then activates the convergence algorithm of I-GENET to find a solution for the current set of constraints. If the network converges to a solution state, the ANN-based constraint-solver reports the network convergence in **S*** in figure 4.1 to the Prolog system. Control will then be passed back to the Prolog frontend for subsequent derivation steps. Otherwise, the ANN-based constraint-solver reports the exhaustion of resource in **S*** to the Prolog system. Then, the Prolog frontend signals the user with exhaustion of resource. Connection weights are retained across derivation steps to facilitate the learning of the neural network since the learning results (connection weight) from previous derivations prune the search space. Thus, this incremental learning mechanism enhances the network convergence. If the derivation is successful, the solution state $\theta_N$ for the answer network $N$ in the final derivation step is passed to the Prolog system. Then, the Prolog frontend returns the computed answer, the union of $\theta_N$ and the composition of $\alpha$-substitutions generated in the successful derivation, to the user. This mechanism reflects the tight coupling between logical deduction and neural computation for constraint-solving in PROCLANN.

## 4.2 Implementation Issues

The Quintus Prolog system is used to implement the frontend CLP system in the prototype. The ANN-based backend constraint-solver is implemented using foreign C functions. Hence, Prolog declarations for the interface of the foreign C functions are placed in the beginning part of any PROCLANN program in the prototype language.

Figure 4.3 shows the Prolog declarations for the frontend of the prototype. The built-in predicate `op/3` declares the precedence of operators for the primitive constraints such as the disequality constraint "`#\=`" defined in the prototype language. All these declarations provide a customized environment for the Prolog system to act as the frontend constraint logic programming system of the prototype for goal reduction and constraint generation. The generated constraints will then be passed to the backend ANN-based constraint-solver for further scrutiny.

The backend ANN-based constraint-solver, I-GENET, is implemented in a

```
% Make declarations for the operators of the primitive constraints
:- op(800, xfx, '#\=').
:- op(800, xfx, '#=').
:- op(800, xfx, 'even').
:- op(800, xfx, 'odd').
:- op(800, xfx, '#/=').

% Declare the foreign C functions
foreign_file('Proclann.o', [init, addDomain, addConstraints, new,
ntry, dump_result, set_interval]).

foreign(init, c, init).
foreign(addDomain, c, addDomain(+term, +term)).
foreign(addConstraints, c, addConstraints(+term)).
foreign(set_interval,c, set_interval(+integer)).
foreign(dump_result, c, dumpRes).
foreign(ntry, c, ntry(+integer)).
foreign(new, c, new).

:- load_foreign_files(['Proclann.o'], []),
abolish(foreign_file, 2),
abolish(foreign, 3).

% Initialization of the prototype system
:- init.
```

Figure 4.3: The Prolog declarations for the frontend of the prototype.

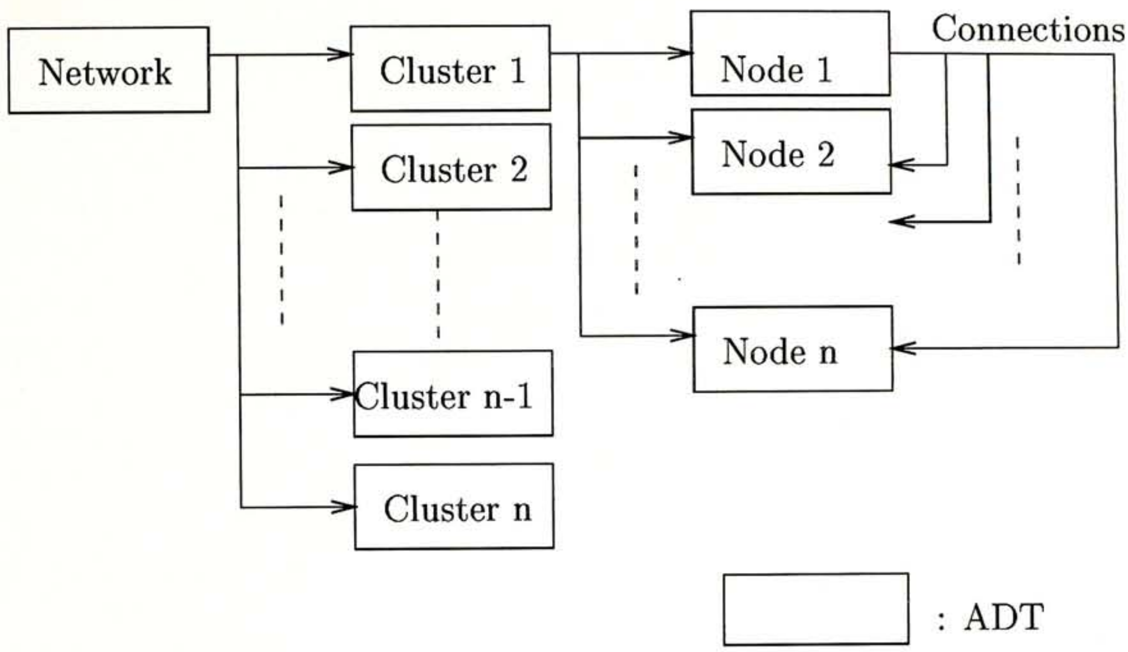


Figure 4.4: Data structure of the ANN in our prototype.

Quintus Prolog foreign C object file. There is no Prolog coding involved. The foreign C object consists of 1600 lines of C code. I-GENET is implemented as an abstract data type (ADT). We have also implemented private ADT for the clusters and nodes of I-GENET. Figure 4.4 shows the data structure of I-GENET. In our design, the ADT for I-GENET is implemented with interface functions for testing of network convergence and heuristic learning. Each cluster in the neural network is implemented as a list of nodes, together with functions for creating connections and updating the states of nodes. Each node in the network is a private ADT with functions for calculating its input from the neighboring nodes. Connections for each node is stored inside the node as a list of pointers pointing to its neighbors.

```
/* ADT for the I-GENET network */
typedef cluster_type* cluster_ptr;
typedef cluster_ptr* network_type;

void initialize(network_type);
int converge(network_type);
void learn(network_type);
```

Figure 4.5: Declarations for the ADT and interface functions of the I-GENET network.

Figure 4.5 shows the C declarations for the ADT of the I-GENET network and the interface functions in the prototype. The `network_type` in the C declarations represents the ADT for the neural network in the prototype implementation. It is defined as an array of data items of the `cluster_type`. The `initialize/1` function randomly selects an on-node for each cluster of I-GENET. The `converge/1` function tests for the network convergence of I-GENET. The `learn/1` function applies heuristic learning rule when the network is trapped in local minima.

Figure 4.6 shows the C declarations for the private ADT of a I-GENET cluster with its interface functions. The `cluster_type` represents an abstraction of the data structure for each cluster in the neural network. It is declared as a C structure with its attribute as the variable name (vname), the domain size (card), the index of on-node (onode) and the pointer (node) to an array of nodes it contained. The `state_update/1` function applies the state_update rule to a cluster of the network and reports the status of the cluster to the I-GENET network.

```
/* ADT for a I-GENET cluster */
typedef node_type* node_vec;
typedef struct {
unsigned char cstd;
unsigned long vname;
unsigned short card;
unsigned short onode;
node_vec node;
} cluster_type;

int state_update(cluster_type);
```

Figure 4.6: Declarations for the ADT and interface functions of the I-GENET cluster.

```
/* ADT for a I-GENET node */
typedef struct nodetype {
long label;
unsigned char state;
int input;
int** nbrins;
int** conns;
unsigned short fanin, max_fanin;
} node_type;

void broadcast(node_type, int);
```

Figure 4.7: Declarations for the ADT and interface functions of the I-GENET node.

# Chapter 5

# Benchmarking

We compare the performance of our prototype implementation and the current state of art of CLP implementation, the Cosytec CHIP version 4.0.1 language on two CSP's. Our benchmarks include the $N$-Queens problem and some simple and hard graph-coloring problems. We also compare PROCLANN with the forward-checking algorithm with dynamic variable ordering and the same algorithm augmented with conflict-directed back-jumping on an instance of exceptionally hard problems (EHP's). Results show that CHIP is more efficient than PROCLANN on the $N$-Queens problem which contains much symmetry. On all instances of the graph-coloring problem under test, PROCLANN out-performs CHIP. The efficiency of PROCLANN is best demonstrated in the hard graph-coloring problems. EHP's are designed to defeat forward-checking algorithms, which form the core part of CHIP. PROCLANN is not hindered by the instances of EHP that we test. ALl benchmarkings is performed on a SUN SPARCstation 10 model 30. The time unit is in seconds of CPU time.

## 5.1 $N$-Queens

The $N$-Queens problem is to place $N$ queens onto a $N \times N$ chessboard so that none of the queens attack each other. Two queens attack each other if they are placed on the same column, row or diagonal. The $N$-Queens problem is a common benchmark for CSP's since the number of queens can be increased without limit.

### 5.1.1 Benchmarking

The PROCLANN $N$-Queens program is shown in Figure 3.1. The CHIP counterpart is adopted from the one that comes with the Cosytec package. Note that the first-fail principle [24] is used in labeling in the CHIP program. PROCLANN execution is probabilistic in nature. The recorded time for PROCLANN represents timing for average of ten runs.

Figure 5.1 reflects a comparison between PROCLANN The recorded time for CHIP is the time taken to obtain the *first* solution. The graphs were generated by taking the logarithm of the recorded time. The curve for CHIP exhibits irregularity, with a highest sudden peak at 90-Queens. The PROCLANN time rises exponentially from 5- to 149-Queens. At 149- and 150-Queens, CHIP does not return in 24 hours. PROCLANN works at 149-Queens but 150-Queens exceeds the capacity of the Prolog engine part of PROCLANN.

### 5.1.2 Analysis

Similar to Prolog, CHIP employs a left-to-right depth-first search strategy to explore the derivation tree of a query. The time to find the first solution depends

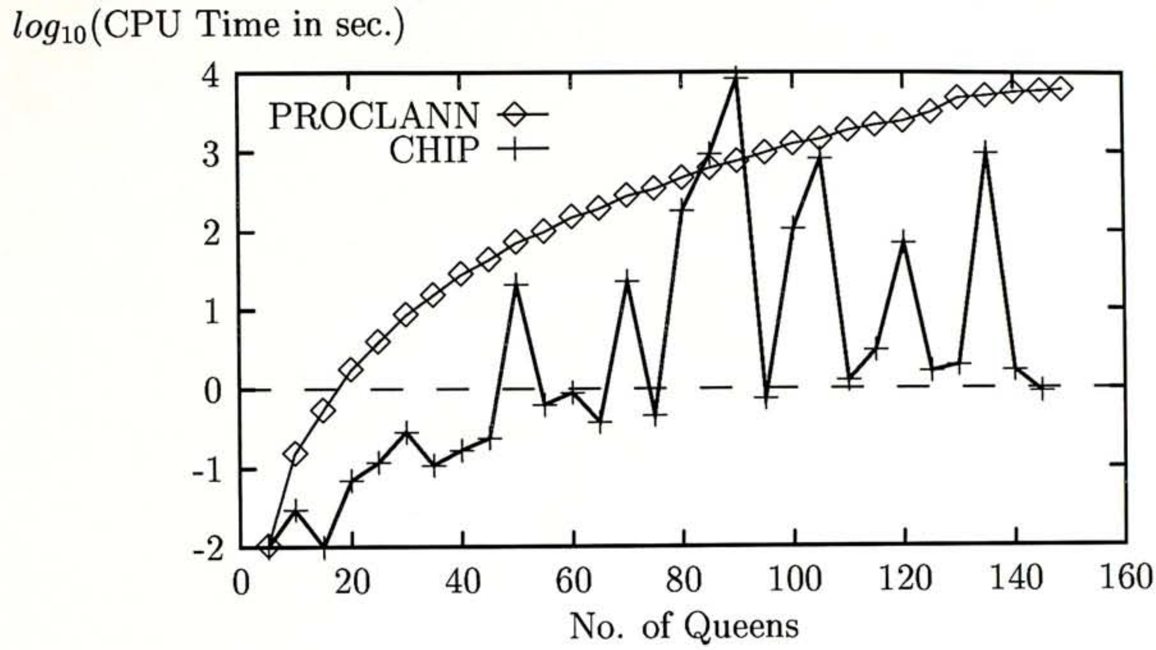


Figure 5.1: A First Comparison between PROCLANN and CHIP.

on the distribution of solutions in the tree, and in particular, the location of the first solution branch in the tree. If the branches to te left of the first solution branch are "bushy" and "deep", then much time is spent in backtracking before reading the first solution. This explains the irregularity shown in the CHIP curve, especially the anomaly at the 90-Queens. We find that the number of backtrackings required for CHIP to find the first solution at the 85-Queens and 95-Queens are 441, 570 and 1 respectively while the number of backtrackings required at the 90-Queens is 2, 197, 773. Thus, much time is spent in backtracking before finding the first solution at the 90-Queens. In general, the CHIP approach is incredibly sensitive to data [11]. Any random change in the definition of constraints can result in drastically different runtime behavior.

In general, CHIP out-performs PROCLANN on finding the first solution from 5- to 149-Queens. The reason can be explained as follows. PROCLANN

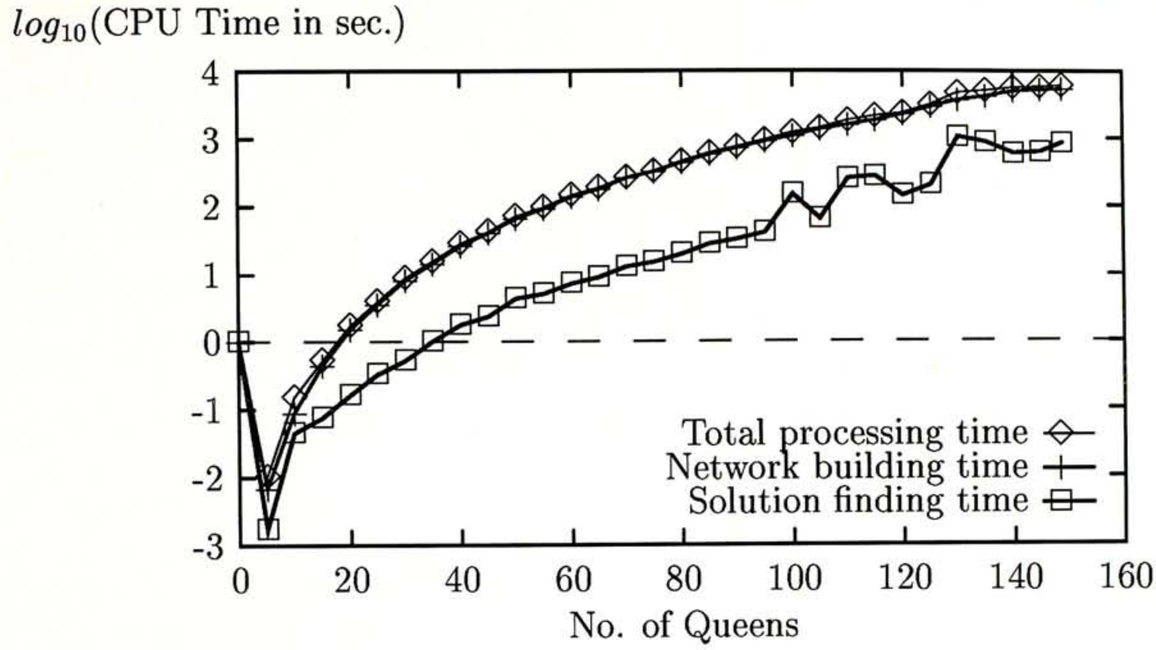


Figure 5.2: Breakdown of PROCLANN Execution Time.

execution can actually be divided into two parts: network building and solution finding by ANN. The former consists of creation of clusters of nodes (when the `in/2` predicate is encountered) and making inhibitory connections between nodes (during a derivation step). The latter is realized by executing the I-GENET convergence procedure. Figure 5.2 shows the breakdown of the total processing time of PROCLANN for the $N$-Queens problem into these two components. In making inhibitory connections, a form of consistency checking is performed. For the $N$-Queens problem, PROCLANN has to build large networks which grow exponentially in size. Thus PROCLANN spends considerable time in building the network, which consumes most of the time for finding the first solution in Figure 5.1. The time for exercising the network convergence procedure is, in general, relatively small. For CHIP, however, the execution time always depends on the amount and depth of the backtracking required for the branches to the

## 5.2 Graph-coloring

The graph-coloring problem is to color a graph, possibly non-planar, so that no two adjacent vertices in the graph have the same color. It is a practical CSP which has many useful applications. Production scheduling, construction of examination timetables, and the storages of goods can all be stated as graph-coloring problems [53]. We compare PROCLANN and CHIP on some simple randomly generated graph-coloring problems and a set of hard graph-coloring problems[1] described in [28].

### 5.2.1 Benchmarking

The PROCLANN graph-coloring program is shown in Figure 3.2. The results are presented in Tables 5.1 and 5.2 respectively. The CPU time of PROCLANN reported in the tables is the average time over ten runs. The first-fail principle [24] is also used in labeling in the CHIP program.

Table 5.1 gives the timing recorded for both CHIP and PROCLANN to solve the simple graph-coloring problems from 10- to 250-vertices. They both manage to solve the problems in a timely manner. PROCLANN out-performs CHIP in all runs. Figure 5.3 shows the comparison between CHIP and PROCLANN on these simple problems. The execution time for PROCLANN grows much slower than that of CHIP from 10- to 250-vertices. PROCLANN requires, in general, less than half of the CHIP time to find a solution in all the cases. Table 5.2 records timing for four hard graph-coloring problems. CHIP cannot manage to solve either of the problems with 125 vertices of the hard graph-coloring

[1] A complete listing of the data files for the hard graph-coloring problems is given in Appendix A.

| graph vertices | colors | CHIP CPU time | PROCLANN CPU time |
|---|---|---|---|
| 10 | 3 | 0.020 | 0.0165 |
| 20 | 4 | 0.050 | 0.033 |
| 30 | 5 | 0.090 | 0.05 |
| 40 | 5 | 0.130 | 0.058 |
| 50 | 6 | 0.200 | 0.083 |
| 60 | 6 | 0.310 | 0.125 |
| 70 | 7 | 0.430 | 0.137 |
| 80 | 8 | 0.5 | 0.183 |
| 90 | 9 | 0.57 | 0.2165 |
| 100 | 9 | 0.7 | 0.2415 |
| 110 | 10 | 0.98 | 0.3085 |
| 120 | 10 | 1.1 | 0.35 |
| 130 | 10 | 1.31 | 0.4255 |
| 140 | 10 | 1.46 | 0.4755 |
| 150 | 10 | 1.81 | 0.55 |
| 160 | 10 | 2.08 | 0.6165 |
| 170 | 10 | 2.23 | 0.683 |
| 180 | 10 | 2.55 | 0.742 |
| 190 | 10 | 2.89 | 0.8 |
| 200 | 10 | 3.4 | 0.933 |
| 210 | 10 | 3.75 | 1.033 |
| 220 | 10 | 4.15 | 1.1245 |
| 230 | 10 | 4.56 | 1.2245 |
| 240 | 10 | 4.95 | 1.3 |
| 250 | 10 | 5.38 | 1.35 |

Table 5.1: benchmarks on simple graph coloring problems

| graph vertices | graph colors | CHIP CPU time | PROCLANN CPU time |
|---|---|---|---|
| 125 | 17 | > 48 hrs | 2.3 hrs |
| 125 | 18 | > 48 hrs | 2.5 mins |
| 250 | 15 | ? | 1.1 hrs |
| 250 | 29 | ? | 4.6 hrs |

Table 5.2: benchmarks on hard graph coloring problems

an exponential growth since CHIP employs a left-to-right depth-first search of a derivation tree. For the hard instances of the graph-coloring problem, PROCLANN can solve all the problems while CHIP fails to return answer for any of them. The size of GENET networks for the graph-coloring problems is much smaller than that for the $N$-Queen problem. Thus, PROCLANN spends relatively small time in network building. Most of the PROCLANN time is spent in the network convergence to find solutions. The branches to the left of the first solutions for these hard problems usually require much backtracking. Thus, CHIP performs much backtracking before it finds the first solution in the search tree. This accounts for CHIP's failure on finding solution for any of these hard CSP's.

## 5.3 Exceptionally Hard Problem

This section discusses an instance of exceptionally hard problems (EHP's) [39]. The exceptionally hard problem (EHP)[2] that we have handled consists of 50 variables, each with domain $\{1, 2, 3, 4, 5, 6, 7, 8\}$. The constraint graph for this

[2] A complete listing of the data file for the EHP is given in Appendix B.

problem is connected. The tightness of the problem is 0.06.

### 5.3.1 Benchmarking

The forward-checking algorithms used in the benchmarking come from Patrick Prosser [40]. The forward-checking algorithm with dynamic variable ordering (fc-dvo) [41], which always chooses variables with the smallest current domain, cannot solve the problem after 711 million consistency checks. However, the same algorithm augmented with conflict-directed back-jumping method and dynamic variable ordering (fc-cbj-dvo) [42] finds a solution with 9588 consistency checks. PROCLANN solves the problem with 2448 convergence cycles in 3.24 seconds on average of 10 runs.

### 5.3.2 Analysis

The EHP at hand contains solution(s) which is very sparse in the search space. Thus, it is a very tight problem. It is an instance of CSP's designed especially to defeat fc-dvo. The performance of PROCLANN is not affected by this hard instance of CSP's.

problems within 48 hours. For the problems with 250 vertices, CHIP runs out of memory on our machine with 64M memory. PROCLANN never fails in the ten runs.

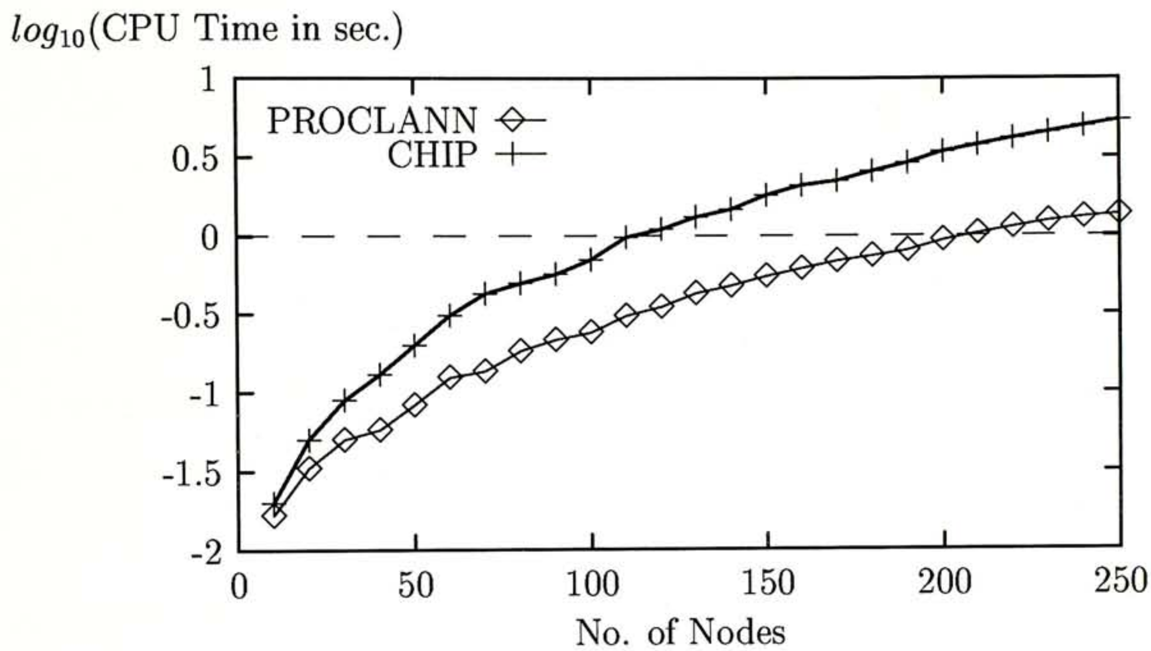


Figure 5.3: Comparison between CHIP and PROCLANN on simple graph coloring problems.

### 5.2.2 Analysis

Table 5.1 shows that PROCLANN is more efficient than CHIP on the simple graph-coloring problems. Figure 5.3 shows that the CHIP time grows exponentially from 10- to 250-vertices. The number of colors used for coloring the graph is kept constant at 10 within the range. When the number of vertices increases, the size of the search tree grows exponentially. Hence, the CHIP time shows left of the first solution. Since the constraints for the $N$-Queens problems are symmetric, for example $X \neq Y + 1$ and $Y \neq X + 1$ where $X$ and $Y$ are d-variables representing the row numbers of queens, the solutions occur in pairs and symmetrically about the central vertical axis of the associated search tree. Therefore, the first solution must be located at the left subtree if solutions exist. In the worst case, CHIP have to traverse the whole left subtree before it can find out the first solution. Otherwise, CHIP can find out the first solution with, in general, little backtracking involved except that the branches to the left of the first solution requires a lot of backtracking, which accounts for the anomaly at 90-Queens. Hence, CHIP can, in general, out-perform PROCLANN on the $N$-Queens problem.

Tsang [50] points out that benchmarks on different algorithms produced using the $N$-Queens problem must be interpreted with caution since the $N$-Queens problem has very specific features: it is a binary CSP in which every variable is constrained by every other variable, which need not be the case in other CSP's. More importantly, in the $N$-Queens problem, each label for every variable conflicts with at most three values of each other variable, regardless of the number of variables (i.e. $N$) in the problem. For example, $< 1, 2 >$ has conflict with $< 2, 1 >, < 2, 2 >, < 2, 3 >$. In an 8-Queens problem, for example, when 2 is assigned to Queen 1, there are 5 out of 8 values that Queen 2 can take. But in the $1,000,000$-Queens problem, there are $999,997$ out of $1,000,000$ values that Queen 2 can take after $< 1, 2 >$ has been committed to. Therefore, constraints get looser as $N$ grows larger. Such features may not be shared by many other CSP's.

Figure 4.7 shows the C declarations for the private ADT of a I-GENET node and the interface functions. Each node in the network is an instance of the `node_type` which is defined as an ADT with its local information: the input (input), state (state), label value (label) and the current number of connections (fanin) together with a pointer (nbrins) to pointers of the input of the neighboring nodes. This array of pointers enables each node to have direct access to the input of its neighboring nodes. Whenever the state of a node is changed, it can directly broadcast any inhibitory/excitatory effect to its neighboring nodes by calling the `broadcast/2` function with a negative or positive value. The `broadcast/2` function then reduces or increases the value of inputs of its neighboring nodes, thus reducing the need to calculate the input to each node of all the clusters after applying the state update rule. Since the state update rule is a frequent step in the convergence algorithm, this will result in significant savings in the overall computation. Moreover, this array of pointers removes the dependency of the state update rule on the explicit representation of connections between incompatible nodes. Thus, connections for each node is only stored as a pointer to an array of numbers in which each neighbor of the node is represented by its cluster number and node index for economy of memory space. Since the network is a two-dimensional array of nodes, neighboring nodes can also be readily accessed by this compact information efficiently. Hence, these two lists of pointers helps to achieve higher efficiency while retaining it space requirement to the minimum. Last but not least, data encapsulation provided by ADT eases modification for future extensions.

# Chapter 6

# Conclusion

This chapter summarizes the work done in this research project and suggests some possible future extensions. We discuss the contribution of this research in the first part. The limitations of our prototype implementation are described in the second part. The last part sheds light on several directions for future studies.

## 6.1 Contributions

This research project proposes a radically new approach for integrating artificial neural network and constraint logic programming. Using constraint logic programming or ANN to solve CSP's is not a new approach. But our proposal represents a radically new approach in the sense that we have proposed a new integration for putting the right ingredients, CLP and ANN, together. The contribution of this research is six-fold.

First, we identify that artificial neural network models can be used as backend constraint-solver of a CLP system. We define four objective criteria, network uniqueness, soundness, probabilistic completeness and the incrementality, for the constraint-solver. Any ANN model that satisfies these objective criteria can be used for the purpose.

Second, we study the GENET model and its dynamics. The network structure and convergence procedure of GENET for both binary and non-binary CSP's have been studied thoroughly. The dynamics of GENET is analyzed from the energy perspective. We show how GENET satisfies the first three of these objective criteria. We also show how the GENET model can be adapted to incremental execution as I-GENET to satisfy the incrementality criterion. Thus, GENET can be adapted to satisfy the objective criteria required for incorporation into the PROCLANN framework.

Third, we define the PROCLANN language and its computation model. PROCLANN is a committed-choice language. Each clause selected by the CLP system is committed after a guard test. The union of the constraints generated from unification and the constraints contained in the goal and the committed clause is injected into the ANN-based constraint-solver for further scrutiny. The PROCLANN computation model defines a tight coupling relationship between the neural computation of the ANN-based constraint-solver and the logical deduction of the CLP system. Since PROCLANN is *not tied* to any specific ANN model, it can be regarded as a general theoretical framework for the integration of artificial neural network and constraint logic programming.

Fourth, we prove that PROCLANN retains the important semantic properties, namely soundness and weak completeness. The latter is probabilistic in nature. A computed answer $\theta$ is the union of solution state of answer network $N$

at the last derivation step and the composition of most general $\alpha$-unifiers generated for all the derivation steps. PROCLANN is sound since $P \cup \mathcal{T} \models_{\mathcal{D}} \forall(Q\theta)$, where $P$ is a PROCLANN program, $\mathcal{T}$ is a first-order theory which axiomatizes the constraint domain $\mathcal{D}$ in consideration and $Q$ is a PROCLANN query. PROCLANN is weakly complete since PROCLANN has non-zero probability to find any computed answer $\theta$ if $P \cup \mathcal{T} \models_{\mathcal{D}} \forall(Q\theta)$.

Fifth, we introduce non-determinism into a committed-choice language. PROCLANN as a committed-choice language supports both *don't care* and *don't-know* non-determinism. The don't-care non-determinism originates from the execution of goal reduction in the CLP system. The generation of solution in the ANN-based constraint-solver supports the don't-know non-determinism. Thus, the don't-know non-determinism in PROCLANN is probabilistic in nature. Hence, PROCLANN allows the generation of multiple answer to a query. This is a *novel* feature of PROCLANN.

Sixth, a prototype implementation of PROCLANN is built using I-GENET and its efficiency compares well against forward-checking algorithms on some hard instances of CSP's. The prototype was constructed in only two man-months. There are still many optimization possibilities. PROCLANN is shown to be more efficient on hard instances of CSP's.

## 6.2 Limitations

Our prototype implementation of PROCLANN has a few limitations which are stated as follows.

The GENET algorithm is semi-decidable, just as the behavior of most other random-based algorithms. It cannot be used to detect inconsistent CSP's. To avoid infinite looping, we usually pose a limit on the number of convergence cycles or the consumption of other system resources. When PROCLANN exits from resource exhaustion, the user is not able to tell whether he/she is unlucky in that particular run or the CSP is inconsistent.

PROCLANN is a committed-choice language. It cannot handle CSP's which require tree search on constraints, an example of which is disjunctive scheduling. In disjunctive scheduling, a remedy is to avoid tree search on constraints by defining disjunctive constraints, such as "$X_1 = 2$ or $X_5 = 2$", tailored for each application. The disjunctive constraints can then be added into the constraint-solver to handle that particular application.

## 6.3 Future Work

There are a few directions for future work of this research project. The following subsections shed lights on the different topics: parallel implementation, general constraint handling, substitutes for GENET and other domains for further studies.

### 6.3.1 Parallel Implementation

According to Wang and Tsang [49], a massively parallel VLSI implementation of GENET may attain a speedup in the order of $10^6$ to $10^8$ over existing CSP languages running on commercial workstations [57]. Since performance of PROCLANN depends much on the backend ANN-based constraint-solver, a massively parallel implementation of PROCLANN will also be expected to have significant speedup over the present sequential prototype implementation. Moreover, the inherent data parallelism in GENET suggests implementation of PROCLANN on massively parallel SIMD computers. The idea is to execute goal reduction at the frontend of the SIMD machine. Constraints generated will be passed to I-GENET running in the massively parallel backend. In fact, the locality of data stored in each node of the GENET network promotes data independence. Thus, I-GENET is implemented as ADT in the prototype implementation of PROCLANN. Due to the independent behavior of each private ADT, each node in the network can readily be regarded as an autonomous process assigned to the individual processor on the parallel machine. In this way, the ADT facilitates the parallel implementation of the language.

### 6.3.2 General Constraint Handling

The I-GENET model used in the backend constraint-solver of our prototype implementation can only handle binary constraints over finite domains. This apparent jeopardy to the expressiveness of the PROCLANN prototype can be resolved by the fact that, with finite domains, all non-binary constraints can readily be transformed into binary constraints [50]. We have not yet investigated its effect on efficiency. In fact, a GENET architecture for solving general constraints such as illegal and atmost constraints [9] in the car-sequencing problem is presented in [12]. It should be interesting to check if the model can be adopted for all general constraints. Besides, the handling of fuzzy constraints will be another desirable feature to enhance the applicability of the language.

### 6.3.3 Other ANN Models

We use the GENET model only to demonstrate the applicability of our approach. Actually, GENET can be regarded as a parallel execution of min-conflict heuristic [35] in the neural network model. Besides, many heuristic methods [22, 36, 45] have been proposed to solve large-scale or hard instances of CSP's efficiently. So, the design of new ANN models which are based on a different heuristic or a variety of heuristics would be an interesting topic for further studies. Moreover, other ANN models for constraint satisfaction have been studied in details in [37]. Hence, the suitability of other ANN models as substitutes of GENET in the backend constraint-solver should be investigated.

### 6.3.4 Other Domains

Although the PROCLANN language is tailored to finite domain constraint-solving, the PROCLANN computation model is defined to be independent of the constraint domain. Hence, the suitability of other constraint domains for PROCLANN are topics of further studies.

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# Appendix A

# The Hard Graph-coloring Problems

The format of a file for the graph-coloring problem is as follows. All the nodes in a graph with $N$ nodes for the problem are labeled from 1 to $N$. Each line defines a list of adjacent nodes to each node $i$ in the graph in the following way:

$$i.\, j\ k\ \cdots\ w$$

where nodes $j, k, \cdots, w$ denote all the adjacent nodes to node $i$ in the graph. The following are the complete listings for the hard instances of the graph-coloring problems used in the benchmarking. The GC125 problem denotes a graph-coloring problem with 125 nodes. It is tested with 17 and 18 colors in the benchmarking. The GC15 problem represents a graph-coloring problem with 250 nodes and 15 colors. And the last GC29 problem represents a graph-coloring problem with 250 nodes and 29 colors.

**GC125:**

```
   1. 2 3 4 5 6 10 11 12 13 15 16 17 18 21 22 25 26 27 28  29  30
32 33 36 37 38 40 45 46 47 49 54 56 57 58 59 60 61 62 67 69 71 80
81 82 83 84 91 92 93 94 95 96 97 98 99 100 101 103  104  105  106
107 108 114 116 117 120 121 122 123 124
   2. 1 4 5 6 7 10 11 13 14 15 18 21 23 26 27 28 30 31 32  33  34
35 37 39 40 42 44 46 49 50 54 55 56 57 58 59 60 61 62 64 66 67 68
70 72 73 74 75 76 78 79 82 89 91 94 98 100 102 104  105  111  113
114 115 116 118 123 124
   3. 1 4 5 6 7 8 10 13 14 17 18 24 25 28 30 32 33 34 36 37 40 41
```

42 43 44 45 49 50 54 57 59 60 61 64 65 66 69 71 74 78 79 80 81 82 83 84 85 87 89 91 94 97 101 105 106 107 108 110 111 112 113 114 118 119 120 121 122 124

4. 1 2 3 6 10 12 14 16 17 18 21 23 24 25 27 29 30 32 34 35 39 40 41 43 45 46 47 51 52 55 56 58 60 61 63 66 67 68 71 73 76 77 79 81 85 87 90 92 93 94 96 101 103 104 105 112 113 114 115 116 117 118 121 124 125

5. 1 2 3 8 9 11 12 13 15 16 17 20 24 30 31 35 41 44 47 48 51 54 55 59 61 62 65 66 67 71 76 77 78 79 84 86 87 88 91 92 93 96 98 100 101 102 103 104 106 107 109 111 112 120 125

6. 1 2 3 4 7 10 11 17 18 19 21 23 26 28 29 34 36 37 38 42 44 46 47 48 49 51 52 53 54 55 56 58 59 60 61 65 66 67 72 75 80 81 82 84 85 89 90 91 92 95 96 98 99 100 101 103 106 110 111 112 114 116 119 120 121 123 125

7. 2 3 6 10 12 14 18 19 20 21 24 25 26 31 32 35 36 37 38 39 40 43 44 45 46 47 50 51 52 57 58 59 61 63 65 67 68 72 78 79 81 82 83 86 87 92 93 94 95 96 99 100 106 110 111 113 115 118 120 121 122

8. 3 5 10 11 12 13 14 15 16 17 18 21 24 26 29 33 35 36 38 43 45 48 50 54 56 58 59 61 64 69 72 73 74 75 76 77 78 80 82 83 84 85 86 90 95 96 99 100 101 104 105 107 109 114 116 117 118 122 125

9. 5 11 12 13 16 17 21 22 23 24 25 27 32 34 35 37 38 40 46 47 49 50 51 52 54 55 56 57 59 64 65 66 67 69 71 72 73 74 75 77 78 81 82 83 84 85 86 87 88 90 96 100 106 107 108 111 117 118 119 122 123

10. 1 2 3 4 6 7 8 14 15 16 17 19 21 25 26 27 28 29 30 31 33 36 37 38 40 41 44 45 48 50 58 60 64 66 67 68 71 72 74 79 81 84 85 87 88 89 91 92 94 95 96 97 101 102 103 105 108 109 110 116 117 118 119 120 121 123 125

11. 1 2 5 6 8 9 12 13 20 22 23 25 28 30 31 32 34 37 40 41 43 45 46 48 49 52 54 55 57 58 59 61 62 67 68 71 73 75 79 82 83 85 86 87 88 89 90 91 93 99 102 103 104 105 108 112 113 114 119 122 123

12. 1 4 5 7 8 9 11 13 15 17 18 20 21 24 26 30 32 33 34 36 39 41 43 45 46 48 50 51 53 54 57 59 62 63 64 65 72 74 75 76 77 79 81 85 87 89 90 92 97 98 103 104 105 108 109 112 113 116 119 121 122 123 125

13. 1 2 3 5 8 9 11 12 15 16 17 18 20 21 22 24 25 29 33 35 36 39 41 43 47 48 50 54 59 60 63 64 65 69 70 74 75 76 78 81 83 84 85 87 88 89 93 94 98 99 100 102 103 107 108 110 112 113 115 116 117 120 121 123

14. 2 3 4 7 8 10 20 24 29 31 35 37 38 39 40 42 43 44 46 47 48 50 51 55 57 61 64 65 66 67 70 71 72 74 75 77 78 79 84 89 90 91 93 94 95 97 98 100 104 105 109 112 114 118 119 120 121 123 124 125

15. 1 2 5 8 10 12 13 17 18 19 21 22 26 29 30 31 33 36 37 41 43 47 51 52 54 55 57 59 63 65 66 67 70 74 75 77 78 81 82 83 86 89 92 93 94 98 100 103 104 105 106 109 110 114 115 117 120 122 124 125

16. 1 4 5 8 9 10 13 17 19 21 22 23 24 25 26 27 29 30 31 33 34 36 37 38 39 42 45 48 51 53 54 55 57 58 59 60 65 69 73 76 80 81 83 84 85 86 87 89 91 96 99 100 101 102 105 112 115 118 119 120 122 123

17. 1 3 4 5 6 8 9 10 12 13 15 16 20 22 23 25 26 27 29 30 32 34 35 36 39 43 47 50 56 57 58 61 62 64 65 67 68 69 73 74 75 76 77 78 79 82 84 85 90 91 93 97 98 100 102 103 104 105 106 108 109 110 111 112 114 115 116 117 118 120 124

18. 1 2 3 4 6 7 8 12 13 15 19 20 21 22 23 25 26 27 28 30 31 32 35 36 39 43 45 46 48 50 51 54 55 57 59 60 62 64 67 72 73 74 76 77 79 81 84 85 86 87 88 89 91 92 93 94 97 99 100 101 103 104 105 106 107 112 114 116 117 119 120 121 125

19. 6 7 10 15 16 18 20 22 23 24 26 27 31 33 34 35 37 38 39 40 41 45 49 52 53 56 59 60 61 64 65 66 69 72 73 74 79 80 81 82 83 84 87 88 90 92 93 97 98 100 101 102 103 104 107 108 112 115 116 117 119 120 121 124 125

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21. 1 2 4 6 7 8 9 10 12 13 15 16 18 22 24 26 27 29 31 33 37 38 40 41 44 45 46 47 48 51 52 53 54 55 58 60 61 62 63 64 65 66 71 74 75 78 79 81 83 85 87 88 91 93 98 100 104 110 113 114 116 118 120 122 123

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24. 3 4 5 7 8 9 12 13 14 16 19 20 21 22 23 25 26 28 29 33 34 35 38 41 42 43 44 45 47 48 49 50 51 54 55 56 58 62 63 66 67 68 69 70 72 74 76 78 79 80 82 87 88 91 93 95 96 98 99 100 101 102 104 105 106 109 110 111 113 114 116 118 119 123 125

25. 1 3 4 7 9 10 11 13 16 17 18 20 22 23 24 26 27 29 30 31 32 34 35 37 39 40 42 43 44 46 48 49 52 53 55 60 61 64 65 67 73 79 81 84 85 86 89 93 95 99 103 104 105 106 108 110 118 119 121 124 125

26. 1 2 6 7 8 10 12 15 16 17 18 19 20 21 23 24 25 28 30 33 34 36 38 40 41 42 43 44 45 46 47 48 50 52 53 54 55 57 58 59 60 61 62

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28. 1 2 3 6 10 11 18 22 23 24 26 29 30 32 33 34 36 38 39 42 44 45 47 50 52 54 55 56 57 58 59 65 66 67 69 70 71 72 74 75 79 81 83 86 87 88 89 90 92 94 95 97 98 101 102 104 105 106 112 114 115 117 118 119 120 121 123 125

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30. 1 2 3 4 5 10 11 12 15 16 17 18 20 23 25 26 27 28 35 36 37 38 41 45 46 49 52 53 58 62 63 65 68 70 71 73 74 75 76 77 79 85 87 88 93 95 96 97 98 99 102 104 105 107 108 109 110 111 112 113 114 117 118 124

31. 2 5 7 10 11 14 15 16 18 19 20 21 23 25 29 36 37 38 41 43 45 46 48 50 54 58 59 61 62 63 64 65 66 68 70 73 74 77 79 81 83 84 86 87 88 94 98 100 101 102 104 106 112 113 115 120 121

32. 1 2 3 4 7 9 11 12 17 18 25 28 29 33 35 36 37 38 43 47 48 52 53 55 59 62 63 64 66 67 68 71 72 75 78 83 84 93 94 98 99 101 105 106 107 108 109 110 112 113 114 115 118 119 121 123

33. 1 2 3 8 10 12 13 15 16 19 21 22 24 26 27 28 29 32 34 36 37 40 41 42 43 45 46 47 48 49 51 52 54 58 61 62 65 66 68 72 77 78 79 80 82 83 84 85 86 88 89 90 92 95 96 97 98 99 100 102 103 105 106 108 109 110 111 114 115 117 118 119 124

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36. 1 3 6 7 8 10 12 13 15 16 17 18 22 26 28 30 31 32 33 34 37 42 44 47 48 49 50 53 55 56 57 58 63 66 67 68 69 72 73 74 75 80 81 82 85 88 93 96 97 99 101 102 103 104 105 107 108 110 112 113 114 115 116 121 122

37. 1 2 3 6 7 9 10 11 14 15 16 19 21 22 25 30 31 32 33 36 40 43 45 46 48 54 56 58 63 65 67 68 71 72 74 75 78 80 82 83 85 88 93 96 97 99 100 102 103 108 109 110 113 116 118 119 120 121 122 123

38. 1 6 7 8 9 10 14 16 19 21 22 23 24 26 28 29 30 31 32 35 40 42 43 44 45 49 51 52 54 55 57 59 60 62 63 64 66 68 69 70 71 76 77

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41. 3 4 5 10 11 12 13 15 19 20 21 22 24 26 30 31 33 35 40 44 45 50 53 57 58 59 61 63 74 75 76 82 86 87 90 93 95 98 100 105 107 109 111 112 113 115 116 118 119 120 121 122 123 125

42. 2 3 6 14 16 20 24 25 26 28 33 34 36 38 40 44 47 49 50 51 52 53 55 56 57 60 62 63 64 66 67 70 72 75 76 77 79 81 82 83 84 86 87 91 95 97 98 99 102 106 110 115 117 122 123 125

43. 3 4 7 8 11 12 13 14 15 17 18 20 23 24 25 26 31 32 33 37 38 39 44 45 50 53 56 57 58 60 65 66 68 75 76 78 79 83 84 88 91 97 99 102 104 106 107 108 109 110 112 114 116 119 121 124 125

44. 2 3 5 6 7 10 14 20 21 23 24 25 26 28 29 34 35 36 38 39 40 41 42 43 45 50 51 52 53 56 57 58 60 61 64 65 69 70 71 72 78 80 82 83 87 91 92 93 94 98 100 101 104 107 110 111 112 113 115 117 121 122 123

45. 1 3 4 7 8 10 11 12 16 18 19 20 21 22 23 24 26 27 28 30 31 33 35 37 38 39 40 41 43 44 48 51 54 56 59 61 62 63 66 67 68 70 71 72 73 74 78 80 81 82 83 84 92 93 94 96 103 111 112 114 117 118 119 122

46. 1 2 4 6 7 9 11 12 14 18 21 23 25 26 29 30 31 33 34 35 37 47 48 51 52 53 54 56 58 59 60 61 64 65 68 71 73 74 78 79 80 82 84 85 86 90 91 94 95 100 105 106 107 108 110 111 112 113 114 115 117 118 120 123 125

47. 1 4 5 6 7 9 13 14 15 17 20 21 22 23 24 26 27 28 29 32 33 34 36 42 46 49 51 52 53 54 55 57 59 61 62 63 64 67 69 70 73 77 78 79 81 82 85 87 89 91 94 96 97 98 100 102 103 104 105 106 108 113 115 118 120 123 124

48. 5 6 8 10 11 12 13 14 16 18 21 24 25 26 31 32 33 34 36 37 39 40 45 46 49 50 51 52 54 56 57 58 60 63 64 65 66 67 68 69 70 71 74 77 78 79 82 83 84 88 90 91 92 94 95 96 97 99 102 105 107 108 111 113 114 115 118 121 123 125

49. 1 2 3 6 9 11 19 22 23 24 25 30 33 34 36 38 40 42 47 48 50 52 53 54 57 59 61 62 63 67 68 71 72 74 77 78 79 80 82 83 85 87 89 92 93 96 97 98 102 103 106 107 108 109 112 115 116 122 123 124 125

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51. 4 5 6 7 9 12 14 15 16 18 20 21 23 24 27 33 38 39 40 42 44 45 46 47 48 50 55 56 58 59 61 62 63 64 65 66 67 70 73 74 75 77 79 80 81 82 84 85 89 91 93 95 96 99 100 101 102 108 109 110 113 114 115 117 119 122

52. 4 6 7 9 11 15 19 20 21 25 26 27 28 29 30 32 33 34 38 39 40 42 44 46 47 48 49 53 56 57 64 65 71 72 73 74 77 78 81 85 88 90 91 95 97 98 99 101 106 109 110 111 112 113 114 115 120 122 124 125

53. 6 12 16 19 21 25 26 30 32 34 35 36 40 41 42 43 44 46 47 49 50 52 56 58 59 60 64 66 68 70 71 74 79 81 82 86 87 88 89 93 94 97 99 101 103 105 108 109 111 112 115 116 119 120 121 122 123 124

54. 1 2 3 5 6 8 9 11 12 13 15 16 18 21 23 24 26 27 28 31 33 37 38 39 45 46 47 48 49 50 55 56 57 59 60 61 62 65 69 70 71 72 74 76 79 80 81 82 83 84 85 89 90 92 94 95 96 97 98 99 102 103 105 108 110 114 117 120 121 122 123 124 125

55. 2 4 5 6 9 11 14 15 16 18 21 22 23 24 25 26 28 29 32 34 35 36 38 42 47 50 51 54 57 61 62 65 66 70 72 73 74 77 80 82 85 86 87 90 93 94 97 100 101 102 106 107 110 111 114 115 118 121 125

56. 1 2 4 6 8 9 17 19 20 22 23 24 28 34 35 36 37 39 40 42 43 44 45 46 48 51 52 53 54 57 58 60 61 62 64 65 66 68 71 75 76 80 81 83 84 87 90 93 95 96 99 100 104 106 107 110 111 112 114 116 117 118 119 120 121 123 125

57. 1 2 3 7 9 11 12 14 15 16 17 18 22 26 28 29 34 36 38 39 41 42 43 44 47 48 49 50 52 54 55 56 61 62 64 65 70 72 73 76 77 78 81 83 89 90 92 93 94 96 99 100 101 103 104 105 106 109 111 112 114 118 119 120 121 123 124

58. 1 2 4 6 7 8 10 11 16 17 21 22 23 24 26 28 29 30 31 33 34 35 36 37 39 40 41 43 44 46 48 51 53 56 60 64 66 67 68 69 71 74 76 78 79 80 82 85 86 87 89 95 96 97 98 100 103 104 105 107 108 109 112 114 116 121 122 124 125

59. 1 2 3 5 6 7 8 9 11 12 13 15 16 18 19 23 26 27 28 29 31 32 34 38 40 41 45 46 47 49 50 51 53 54 61 64 65 69 70 71 74 75 79 80 81 82 83 87 88 89 90 91 93 94 97 98 99 100 103 106 108 110 112 114 117 118 121 122 125

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61. 1 2 3 4 5 6 7 8 11 14 17 19 21 22 23 25 26 31 33 41 44 45 46 47 49 50 51 54 55 56 57 59 60 65 67 68 73 76 82 84 85 87 89 91

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62. 1 2 5 11 12 17 18 20 21 22 24 26 29 30 31 32 33 34 35 38 39 40 42 45 47 49 51 54 55 56 57 65 73 74 75 77 78 82 83 86 87 90 91 92 93 96 101 108 109 110 114 116 117 118 120 121 122 123 124 125

63. 4 7 12 13 15 21 22 24 26 27 29 30 31 32 35 36 37 38 39 40 41 42 45 47 48 49 50 51 60 64 65 67 70 77 78 79 80 81 85 90 91 92 94 95 97 99 100 102 105 108 109 110 111 114 115 124 125

64. 2 3 8 9 10 12 13 14 17 18 19 21 22 25 26 31 32 38 40 42 44 46 47 48 51 52 53 56 57 58 59 63 65 69 72 75 76 79 80 82 83 84 85 86 93 96 100 101 104 105 107 109 111 112 114 117 119 120 121 122 123

65. 3 5 6 7 9 12 13 14 15 16 17 19 21 22 23 25 28 30 31 33 37 39 43 44 46 48 50 51 52 54 55 56 57 59 60 61 62 63 64 66 69 73 78 79 81 83 86 87 91 93 96 98 102 104 106 107 108 109 111 112 114 117 119 120 122 123 124

66. 2 3 4 5 6 9 10 14 15 19 20 21 23 24 26 27 28 29 31 32 33 36 38 39 42 43 45 48 51 53 55 56 58 65 69 70 71 72 74 77 78 82 85 88 89 90 91 94 96 97 98 99 102 104 106 107 108 111 112 113 114 115 116 117 118 119 121 125

67. 1 2 4 5 6 7 9 10 11 14 15 17 18 20 23 24 25 28 32 34 35 36 37 39 40 42 45 47 48 49 50 51 58 61 63 72 73 74 79 82 85 88 92 95 97 98 99 101 102 103 105 106 107 109 115 116 122 123 125

68. 2 4 7 10 11 17 20 23 24 26 30 31 32 33 36 37 38 39 40 43 45 46 48 49 53 56 58 61 69 73 74 75 76 78 79 80 82 84 86 88 90 91 92 93 94 98 99 101 104 105 107 108 109 110 112 113 114 116 119 120 123 124

69. 1 3 8 9 13 16 17 19 20 22 24 26 27 28 29 35 36 38 39 44 47 48 54 58 59 60 64 65 66 68 71 78 80 83 87 88 90 91 93 94 95 97 98 99 100 101 102 103 104 106 109 112 113 118 123

70. 2 13 14 15 20 23 24 26 28 29 30 31 34 38 40 42 44 45 47 48 51 53 54 55 57 59 63 66 77 78 81 84 85 86 87 88 90 91 92 93 94 96 98 99 100 102 105 108 113 114 115 118 120 122

71. 1 3 4 5 9 10 11 14 21 23 27 28 30 32 35 37 38 40 44 45 46 48 49 52 53 54 56 58 59 66 69 72 75 77 81 82 84 85 86 88 89 92 94 96 98 100 102 103 107 109 112 113 114 120 121 125

72. 2 6 7 8 9 10 12 14 18 19 23 24 27 28 32 33 34 35 36 37 39 42 44 45 49 52 54 55 57 64 66 67 71 75 77 80 82 83 84 86 89 91 94 95 99 103 104 105 110 111 112 116 117 118 120 122 123 124 125

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74. 2 3 8 9 10 12 13 14 15 17 18 19 21 22 24 28 29 30 31 36 37

41 45 46 48 49 50 51 52 53 54 55 58 59 62 66 67 68 73 77 78 80 82
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75. 2 6 8 9 11 12 13 14 15 17 20 21 27 28 30 32 36 37 39 41 42
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76. 2 4 5 8 12 13 16 17 18 20 22 23 24 26 27 29 30 34 35 38 40
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77. 4 5 8 9 12 14 15 17 18 30 31 33 35 38 39 40 42 47 48 49 51
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78. 2 3 5 7 8 9 13 14 15 17 21 23 24 26 27 29 32 33 35 37 38 39
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79. 2 3 4 5 7 10 11 12 14 17 18 19 20 21 22 24 25 27 28 29 30
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80. 1 3 6 8 16 19 23 24 27 33 35 36 37 44 45 46 49 50 51 54 55
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81. 1 3 4 6 7 9 10 12 13 15 16 18 19 21 25 28 31 36 42 45 47 51
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82. 1 2 3 6 7 8 9 11 15 17 19 20 23 24 33 36 37 41 42 44 45 46
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83. 1 3 7 8 9 11 13 15 16 19 20 21 26 27 28 31 32 33 35 37 40
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84. 1 3 5 6 8 9 10 13 14 16 17 18 19 20 25 27 29 31 32 33 34 35
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85. 3 4 6 8 9 10 11 12 13 16 17 18 21 22 25 26 30 33 34 35 36
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87. 3 4 5 7 9 10 11 12 13 16 18 19 20 21 22 23 24 26 27 28 30 31 34 35 38 40 41 42 44 47 49 53 55 56 58 59 61 62 65 69 70 80 83 84 85 86 93 94 95 96 99 100 102 104 106 108 110 112 114 116 118 120 121 125

88. 5 9 10 11 13 18 19 21 23 24 26 28 29 30 31 33 36 37 40 43 48 52 53 59 66 67 68 69 70 71 73 79 80 81 82 90 91 92 94 95 98 101 102 103 105 106 108 109 112 116 118 122 124

89. 2 3 6 10 11 12 13 14 15 16 18 25 27 28 33 38 39 40 47 49 50 51 53 54 57 58 59 60 61 66 71 72 76 77 78 79 80 81 82 84 85 91 100 101 102 104 106 108 112 113 116 117 119 123 125

90. 4 6 8 9 11 12 14 17 19 20 22 26 28 33 34 40 41 46 48 52 54 55 56 57 59 62 63 66 68 69 70 78 79 81 82 83 88 91 93 94 96 99 104 106 108 111 114 116 117 119 120 121 122 123 124 125

91. 1 2 3 5 6 10 11 14 16 17 18 21 22 24 29 34 38 40 42 43 44 46 47 48 50 51 52 59 60 61 62 63 65 66 68 69 70 72 73 74 75 77 79 80 83 84 86 88 89 90 93 94 96 100 101 104 105 107 110 111 115 117 118 122 123 124

92. 1 4 5 6 7 10 12 15 18 19 20 27 28 29 33 34 35 38 40 44 45 48 49 50 54 57 62 63 67 68 70 71 75 76 78 79 82 83 84 86 88 93 94 96 98 100 101 102 103 104 105 109 111 113 118 119 121 122 123 124

93. 1 4 5 7 11 13 14 15 17 18 19 21 24 25 29 30 32 34 36 37 40 41 44 45 49 51 53 55 56 57 59 60 62 64 65 68 69 70 76 77 78 79 80 83 84 85 87 90 91 92 95 96 97 98 100 102 103 105 106 109 110 113 115 116 118 120 122 123 125

94. 1 2 3 4 7 10 13 14 15 18 23 26 28 29 31 32 38 40 44 45 46 47 48 50 53 54 55 57 59 60 63 66 68 69 70 71 72 77 79 80 81 86 87 88 90 91 92 95 97 101 102 103 104 106 107 108 111 113 116 117 121 123 124

95. 1 6 7 8 10 14 20 22 24 25 26 27 28 29 30 33 34 35 38 40 41 42 46 48 51 52 54 56 58 61 63 67 69 72 73 74 75 76 79 82 83 84 85 86 87 88 93 94 102 107 109 114 115 116 118 120 121 122 124 125

96. 1 4 5 6 7 8 9 10 16 22 23 24 27 29 30 33 34 35 36 37 40 45 47 48 49 51 54 56 57 58 60 62 64 65 66 70 71 80 81 83 87 90 91 92 93 98 100 102 103 106 107 108 110 111 113 119 120 121 124

97. 1 3 10 12 14 17 18 19 22 23 26 28 30 33 35 36 37 42 43 47 48 49 52 53 54 55 58 59 60 61 63 66 67 69 76 79 84 85 86 93 94 99 101 102 103 106 110 112 113 115 117 121 123

98. 1 2 5 6 12 13 14 15 17 19 21 22 23 24 27 28 30 31 32 33 35 39 41 42 44 47 49 52 54 58 59 60 61 65 66 67 68 69 70 71 78 79 80 81 83 84 85 88 92 93 96 100 103 104 106 108 109 110 111 115 116

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99. 1 6 7 8 11 13 16 18 22 23 24 25 26 27 29 30 32 33 34 35 36 37 39 42 43 48 50 51 52 53 54 56 57 59 60 63 66 67 68 69 70 72 73 79 84 85 86 87 90 97 103 105 107 109 117 118 121 122 124 125

100. 1 2 5 6 7 8 9 13 14 15 16 17 18 19 20 21 22 24 26 31 33 34 35 37 38 39 40 41 44 46 47 50 51 55 56 57 58 59 60 63 64 69 70 71 74 77 78 80 81 83 84 86 87 89 91 92 93 96 98 101 102 103 106 108 110 111 113 115 118 119 120 123

101. 1 3 4 5 6 8 10 16 18 19 20 24 26 28 29 31 32 36 38 39 40 44 51 52 53 55 57 60 62 64 67 68 69 73 76 80 81 82 83 85 86 88 89 91 92 94 97 100 103 105 106 108 110 111 112 113 114 117 119 121 125

102. 2 5 10 11 13 16 17 19 20 22 24 28 30 31 33 34 36 37 38 42 43 47 48 49 51 54 55 60 61 63 65 66 67 69 70 71 74 76 81 82 83 84 86 87 88 89 92 93 94 95 96 97 100 103 104 106 109 110 113 114 119 120 122 123

103. 1 4 5 6 10 11 12 13 15 17 18 19 22 23 25 26 27 33 35 36 37 39 45 47 49 53 54 57 58 59 60 67 69 71 72 73 74 75 76 77 79 80 85 86 88 92 93 94 96 97 98 99 100 101 102 104 106 107 108 109 110 112 114 115 118 119 120 122 123

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109. 5 8 10 12 14 15 17 24 26 27 30 32 33 37 41 43 49 50 51 52 53 57 58 60 61 62 63 64 65 67 68 69 71 73 74 77 79 80 81 82 83 84 85 88 92 93 95 98 99 102 103 105 107 111 114 115 116 121 122 123 124

110. 3 6 7 10 13 15 17 20 21 22 23 24 25 30 32 33 34 36 37 39 40

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111. 2 3 5 6 7 9 17 22 23 24 30 33 34 38 39 40 41 44 45 46 48 52 53 55 56 57 60 63 64 65 66 72 73 75 78 80 81 86 90 91 92 94 96 98 100 101 104 106 108 109 110 114 115 116 120 124 125

112. 3 4 5 6 11 12 13 14 16 17 18 19 28 30 31 32 35 36 41 43 44 45 46 49 52 53 56 57 58 59 61 64 65 66 68 69 71 72 73 76 77 79 80 81 82 83 84 85 86 87 88 89 97 101 103 104 106 108 116 117 120 122

113. 2 3 4 7 11 12 13 21 23 24 26 27 30 31 32 35 36 37 38 39 41 44 46 47 48 50 51 52 61 66 68 69 70 71 73 74 75 77 78 79 85 89 92 93 94 96 97 100 101 102 104 105 110 115 116 118 119 120 122 124 125

114. 1 2 3 4 6 8 11 14 15 17 18 20 21 24 26 27 28 29 30 32 33 34 36 38 39 43 45 46 48 50 51 52 54 55 56 57 58 59 61 62 63 64 65 66 68 70 71 73 75 80 81 83 86 87 90 95 101 102 103 106 109 110 111 118 120 121 122 123 124 125

115. 2 4 7 13 15 16 17 19 20 22 23 27 28 29 31 32 33 34 35 36 40 41 42 44 46 47 48 49 51 52 53 55 60 61 63 66 67 70 73 74 77 80 81 85 86 91 93 95 97 98 100 103 106 107 109 110 111 113 116 117 120 122 123 124

116. 1 2 4 6 8 10 12 13 17 18 19 20 21 22 23 24 27 29 34 35 36 37 40 41 43 49 50 53 56 58 62 66 67 68 72 73 80 86 87 88 89 90 93 94 95 98 104 106 108 109 111 112 113 115 119 121 123 124

117. 1 4 8 9 10 13 15 17 18 19 20 28 30 33 39 40 42 44 45 46 50 51 54 56 59 60 61 62 64 65 66 72 73 75 77 80 84 89 90 91 94 97 99 101 112 115 119 121 122 123 125

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120. 1 3 5 6 7 10 13 14 15 16 17 18 19 20 21 22 28 31 34 37 38 39 41 46 47 52 53 54 56 57 62 64 65 68 70 71 72 73 77 79 84 87 90 93 95 96 100 102 103 105 110 111 112 113 114 115 118 121 123 124

121. 1 3 4 6 7 10 12 13 14 18 19 20 25 26 27 28 31 32 35 36 37 40 41 43 44 48 53 54 55 56 57 58 59 62 64 66 71 78 82 84 87 90 92 94 95 96 97 98 99 101 104 106 108 109 114 116 117 120 122 123

122. 1 3 7 8 9 11 12 15 16 21 23 26 27 29 36 37 41 42 44 45 49 50 51 52 53 54 58 59 60 61 62 64 65 67 70 72 73 74 75 77 78 79 80

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123. 1 2 6 9 10 11 12 13 14 16 21 23 24 26 28 32 34 37 38 40 41 42 44 46 47 48 49 50 53 54 56 57 60 61 62 64 65 67 68 69 72 75 78 80 82 84 85 89 90 91 92 93 94 97 98 100 102 103 104 106 108 109 110 114 115 116 117 118 120 121 124

124. 1 2 3 4 14 15 17 19 20 25 29 30 33 39 40 43 47 49 52 53 54 57 58 60 62 63 65 68 72 75 77 82 83 88 90 91 92 94 95 96 98 99 104 105 106 107 108 109 111 113 114 115 116 118 119 120 122 123

125. 4 5 6 8 10 12 14 15 18 19 20 23 24 25 26 28 34 35 38 41 42 43 46 48 49 52 54 55 56 58 59 60 61 62 63 66 67 71 72 73 76 78 79 81 85 86 87 89 90 93 95 99 101 106 107 108 111 113 114 117 118 119 122

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2. 3 4 7 8 9 10 12 15 16 17 18 20 21 27 29 31 33 34 36 38 39 41 43 44 45 46 47 49 50 51 53 54 55 57 60 62 64 66 67 68 70 71 73 74 76 78 82 84 85 88 92 97 98 100 103 106 109 112 114 115 116 118 121 124 126 127 128 129 130 133 135 136 137 138 141 142 145 147 148 149 151 152 153 155 156 157 159 160 164 170 173 174 177 180 182 186 187 192 193 195 196 197 199 203 209 210 211 213 214 215 219 222 224 226 232 233 234 236 238 239 241 242 244 245 247 248

3. 1 2 9 11 16 18 19 23 24 26 32 34 35 37 42 44 46 47 49 50 54 56 60 62 63 64 66 67 70 72 74 79 80 82 83 86 87 88 92 93 94 96 102 104 105 106 107 110 112 113 114 115 123 124 126 127 128 129 132 134 137 141 142 143 144 146 152 155 156 157 158 160 163 164 165 168 169 172 173 175 176 179 184 185 187 188 189 194 195 196 197 198 200 201 202 203 204 210 211 213 214 216 217 218 219 224 227 229 230 233 234 235 236 238 239 240 241 246 247

4. 1 2 5 7 8 9 10 11 13 14 20 21 24 26 29 30 34 36 37 40 43 44 45 46 47 48 53 55 56 59 66 67 70 73 75 76 78 85 86 88 89 95 97 98 100 101 103 105 106 107 110 111 114 117 118 123 124 125 128 129 130 131 134 135 136 137 139 140 142 145 146 147 151 152 153 154 155 156 157 158 162 163 164 167 168 172 173 174 175 178 180

182 183 190 194 197 200 201 203 204 206 207 209 212 213 216 217 219 220 222 223 224 227 230 231 232 237 238 239 240 244 246 247

5. 4 7 8 10 15 16 18 23 24 26 27 29 32 36 40 41 42 44 48 49 52 54 58 60 61 62 63 64 67 68 69 70 71 72 74 78 79 80 83 86 87 88 89 90 91 92 94 99 102 103 104 106 107 108 110 111 112 113 114 115 116 117 118 123 124 125 126 127 130 135 136 137 138 139 140 141 142 145 147 148 149 155 156 157 158 161 163 165 168 169 172 174 176 177 178 181 182 183 184 186 188 189 190 192 193 195 197 198 205 206 207 208 212 214 216 218 219 220 225 227 228 232 233 234 235 236 237 238 239 240 247

6. 9 10 11 12 13 14 15 16 17 19 20 24 29 30 33 34 35 36 38 40 41 44 46 48 49 50 51 52 55 57 61 62 66 69 71 72 73 78 79 80 81 87 89 93 96 98 102 104 105 107 109 110 111 112 117 119 121 122 123 124 127 128 131 132 134 138 141 142 143 147 148 150 151 153 156 157 158 159 160 162 164 165 167 168 169 173 175 177 178 181 185 188 189 199 202 204 205 206 208 209 211 217 219 220 222 223 225 227 228 229 230 231 232 236 238 240 241 242 248 250

7. 2 4 5 8 10 12 14 15 16 20 21 24 25 26 27 29 30 33 36 41 43 44 45 46 49 51 53 54 56 58 59 61 64 69 70 75 76 77 80 83 85 86 87 90 91 93 94 95 97 99 100 101 105 108 110 114 115 118 119 120 122 123 126 127 128 131 135 136 137 139 140 142 143 145 146 150 152 153 154 155 158 159 161 163 165 167 168 170 171 173 174 177 178 179 182 183 186 188 189 190 191 193 194 195 196 199 203 204 205 207 208 213 214 215 216 220 224 225 227 229 231 232 236 241 244 245 247 248 249 250

8. 1 2 4 5 7 10 11 12 14 16 17 18 19 21 24 25 26 27 28 32 34 35 37 39 41 42 44 45 46 47 48 52 56 57 58 61 63 64 66 67 70 71 77 78 79 80 83 85 90 93 94 95 96 98 100 105 107 108 109 110 116 118 120 122 123 129 130 131 133 135 136 137 138 139 140 145 146 149 151 152 153 154 155 157 160 163 165 166 168 169 170 173 174 176 177 178 182 183 184 185 186 189 190 191 192 193 195 196 197 198 199 200 201 205 207 208 209 213 216 218 219 220 222 223 224 225 227 229 230 231 232 233 235 237 239 241 242 244 245 250

9. 2 3 4 6 10 11 19 20 24 25 28 30 31 33 34 35 40 43 44 47 48 49 51 53 56 58 59 60 62 63 66 67 70 71 72 73 74 76 78 79 81 85 86 87 88 92 94 96 97 98 100 101 106 111 114 115 116 118 121 126 127 131 136 137 139 143 146 150 151 152 153 155 157 159 160 162 167 168 169 170 171 172 175 176 178 180 182 183 195 196 198 202 205 206 207 210 211 212 214 215 216 217 221 223 224 226 231 232 233 237 240 245 247 249

10. 1 2 4 5 6 7 8 9 12 16 18 20 21 22 24 25 26 28 31 36 37 40 41 42 43 46 55 58 59 60 64 65 66 67 68 70 74 76 79 80 81 83 84 86

90 92 97 99 100 102 104 105 107 111 112 113 114 118 119 120 121 125 126 129 130 132 133 135 137 138 143 145 148 151 152 153 154 155 156 159 160 161 162 168 169 170 173 179 183 185 186 188 190 193 199 201 206 211 212 213 214 216 218 219 222 223 227 238 241 242 244 245 246 247 250

11. 3 4 6 8 9 13 15 17 18 22 23 24 25 27 28 30 33 34 35 37 40 41 42 44 45 46 47 48 52 54 55 57 63 64 67 69 70 71 73 76 79 81 83 85 86 87 88 90 91 93 94 95 96 97 98 100 101 104 105 108 109 110 111 112 114 116 117 120 121 122 123 125 126 131 136 141 142 143 145 146 147 149 151 155 159 160 161 162 164 165 168 169 171 172 174 175 176 180 182 185 186 187 188 190 193 196 197 201 203 206 209 210 213 214 216 217 218 219 220 222 226 227 231 232 235 237 241 245 247 248

12. 1 2 6 7 8 10 13 16 18 21 23 27 28 31 33 34 37 40 42 44 45 46 47 48 51 52 53 54 60 61 62 63 64 65 67 70 75 77 81 84 85 88 89 92 93 95 97 98 101 102 103 104 106 107 108 112 114 115 116 117 118 123 125 130 133 134 136 139 140 143 144 145 146 149 150 151 152 155 157 159 160 162 164 166 167 169 172 173 174 175 176 178 180 184 185 186 187 189 190 194 195 197 198 201 203 204 205 206 207 208 211 213 214 215 217 221 222 227 230 232 233 235 237 240 242 244 245 246 248 249

13. 1 4 6 11 12 15 19 20 21 22 23 25 30 35 36 37 38 39 40 42 43 45 46 48 49 50 51 53 55 56 57 58 61 64 71 72 73 75 77 78 80 81 82 84 86 87 88 89 90 91 92 95 99 100 101 104 105 106 107 109 111 113 114 115 116 119 120 123 124 127 131 134 136 138 141 142 143 144 145 148 156 157 159 160 165 166 167 169 170 173 179 180 182 186 187 188 189 191 192 194 196 198 200 205 206 210 211 212 214 217 219 221 222 224 226 230 232 238 239 240 245 250

14. 4 6 7 8 17 18 19 23 24 25 29 31 33 36 41 42 43 44 45 46 48 49 50 51 54 55 56 58 59 60 61 63 66 67 69 74 76 77 79 83 84 87 91 92 93 94 95 96 97 98 100 101 102 103 104 108 111 112 114 115 116 117 118 120 125 127 129 133 134 136 137 139 140 144 148 149 151 153 154 155 156 158 159 160 161 162 164 165 167 169 170 174 176 177 178 180 181 182 183 186 187 188 189 191 193 194 195 196 197 202 203 205 206 209 212 213 214 216 220 224 226 227 228 229 231 232 234 236 237 239 242 243 246 247 248 250

15. 2 5 6 7 11 13 22 24 25 26 27 29 32 33 34 39 40 43 44 48 49 50 53 59 60 62 63 64 68 69 71 73 74 78 81 85 86 88 89 93 98 100 101 104 110 111 114 115 117 118 119 121 123 126 129 131 132 133 134 139 140 145 147 148 150 151 152 153 154 155 156 157 159 162 163 166 168 169 170 171 174 175 176 177 178 179 180 181 182 183 184 185 188 190 192 196 197 198 199 200 201 202 203 208 214 215

216 220 225 226 227 229 230 231 232 234 235 237 244 246 247 248 249 250

16. 2 3 5 6 7 8 10 12 18 19 20 23 24 25 27 28 29 31 34 35 36 37 38 43 44 48 49 50 51 52 53 60 61 62 63 64 65 66 68 69 70 73 74 75 77 78 80 83 85 86 87 89 90 95 96 97 100 104 105 106 115 117 123 126 128 129 131 133 134 139 142 150 153 154 156 157 158 160 162 163 165 166 169 174 176 178 179 180 182 183 186 188 190 191 196 199 200 202 205 206 208 212 215 218 223 225 227 229 230 231 232 235 237 238 240 241 242 246 247 248 250

17. 1 2 6 8 11 14 21 22 23 25 26 27 32 34 36 37 39 41 42 43 46 47 49 50 51 54 58 61 62 63 65 66 67 69 70 71 73 74 75 76 77 80 82 83 84 85 86 92 94 95 97 102 103 104 105 108 110 112 118 120 122 123 125 127 129 131 132 135 136 139 143 144 145 149 150 152 158 162 163 167 168 170 171 172 173 174 175 176 178 179 180 183 184 186 187 188 190 191 193 196 197 198 199 200 203 205 207 209 210 211 213 217 218 221 225 227 228 229 231 234 236 237 239 243 247 249

18. 2 3 5 8 10 11 12 14 16 20 22 23 24 26 27 28 29 30 31 35 36 41 43 44 46 48 53 56 57 58 59 63 67 68 69 71 78 80 81 82 85 87 89 92 95 96 97 99 101 103 105 106 107 109 110 112 114 117 119 124 127 132 134 136 137 138 139 140 144 145 148 149 151 152 153 155 156 158 159 160 162 163 164 166 168 170 171 172 173 176 178 180 181 183 187 188 189 194 195 197 198 199 200 202 207 210 213 216 217 223 224 225 226 227 228 229 230 231 233 234 236 238 239 240 241 242 245 247

19. 3 6 8 9 13 14 16 20 28 29 30 32 34 35 36 41 42 43 47 48 50 52 53 54 55 57 58 59 63 68 69 70 72 74 76 77 82 84 87 88 89 90 91 92 96 98 99 101 102 103 104 108 110 111 112 113 114 116 122 125 126 128 130 131 132 133 135 137 138 139 140 142 144 146 148 149 152 153 155 157 159 160 161 162 165 168 169 170 172 174 176 178 179 182 185 187 188 189 191 192 193 195 196 198 199 200 201 202 204 205 208 209 210 211 212 213 216 221 222 224 225 228 230 232 235 236 237 238 240 241 242 243 247 250

20. 2 4 6 7 9 10 13 16 18 19 21 25 29 30 31 34 35 37 41 42 46 48 50 52 55 56 60 62 64 65 67 68 71 72 74 75 76 79 81 84 85 92 95 97 98 100 101 104 107 113 114 116 118 121 123 124 125 127 130 133 134 137 141 143 144 145 146 148 149 150 151 152 153 154 155 156 160 162 163 165 166 168 170 171 176 177 178 179 180 181 183 190 198 205 207 209 210 213 215 216 222 223 226 227 233 235 238 239 240 242 243 244 245 248 249

21. 2 4 7 8 10 12 13 17 20 23 24 25 26 29 31 32 33 34 40 42 43 44 45 47 48 49 50 52 54 55 56 60 63 67 69 70 71 72 73 76 78 80 82

83 84 86 87 88 89 90 92 93 94 95 96 99 100 101 103 104 106 107 109 110 112 114 116 118 120 124 125 129 131 134 135 138 141 143 144 145 146 148 149 151 154 156 157 158 159 160 165 167 170 171 172 174 176 178 179 180 181 182 183 184 185 186 188 189 191 192 194 196 198 201 203 204 205 206 207 211 212 214 216 222 223 225 226 227 228 229 230 231 232 234 238 239 242 247 249

22. 1 10 11 13 15 17 18 24 26 31 32 33 35 36 37 41 42 46 49 54 55 56 57 61 64 65 70 71 72 74 75 81 82 83 86 87 89 90 91 92 94 97 100 103 106 108 109 111 114 115 120 124 125 127 128 129 130 131 133 137 140 141 142 144 146 152 153 160 162 163 164 165 169 170 172 174 175 176 177 178 180 182 184 185 186 188 190 191 193 196 197 198 201 205 206 207 208 209 210 212 214 216 218 219 220 221 222 226 227 232 233 238 242 243 246 247 248 249

23. 1 3 5 11 12 13 14 16 17 18 21 25 27 29 30 33 36 37 40 42 43 46 49 54 56 58 59 61 62 64 65 66 67 73 74 75 76 77 78 79 82 89 90 91 93 95 97 98 99 100 101 102 105 106 108 114 115 118 121 123 127 129 130 133 134 135 137 140 141 142 144 145 148 150 152 153 155 156 158 159 160 161 163 165 167 172 174 175 176 177 178 184 185 186 188 189 190 191 192 195 196 198 201 202 203 205 206 209 211 213 214 215 217 218 219 220 221 222 223 224 226 227 228 231 233 234 236 239 240 244 247 248 249

24. 3 4 5 6 7 8 9 10 11 14 15 16 18 21 22 25 27 29 31 32 33 36 37 39 41 45 46 48 50 51 52 54 55 57 58 59 61 62 63 64 65 66 67 69 71 72 74 75 76 79 82 83 85 86 88 89 90 92 93 95 96 99 100 101 102 106 107 111 112 113 114 118 119 120 121 123 124 126 127 128 131 132 139 141 142 143 145 146 149 154 156 158 160 163 164 165 166 170 171 174 175 179 183 184 185 186 188 189 190 191 193 198 199 200 202 203 206 212 213 214 215 222 224 225 226 227 228 229 231 232 234 239 240 242 243 246 249

25. 7 8 9 10 11 13 14 15 16 17 20 21 23 24 27 28 33 34 35 36 38 41 43 45 46 48 50 51 52 53 54 57 58 59 60 61 62 63 64 65 66 67 68 69 70 73 75 79 81 83 84 86 88 90 91 92 93 95 96 100 101 102 103 105 108 109 112 117 118 119 120 121 124 134 139 140 144 145 147 149 150 151 152 153 154 159 160 162 163 164 167 168 169 170 171 172 173 175 177 178 179 181 183 184 185 190 191 192 194 195 196 198 205 206 208 210 212 214 216 217 219 220 221 223 224 226 227 231 232 234 236 237 240 241 244 245 247 248 250

26. 1 3 4 5 7 8 10 15 17 18 21 22 27 31 37 38 41 42 45 46 47 48 50 53 54 56 60 61 64 65 67 69 70 71 72 73 75 76 77 78 79 83 85 87 96 100 102 103 106 108 111 114 115 117 118 122 125 126 129 133 134 137 139 140 142 144 145 147 148 153 156 159 161 164 165 166 168 169 170 171 173 175 176 180 183 184 187 188 189 190 192 193

194 195 198 199 202 208 209 210 211 215 217 222 227 230 232 233 235 236 237 239 241 243 244 245 248 249 250

27. 2 5 7 8 11 12 15 16 17 18 23 24 25 26 28 29 32 34 36 39 41 45 46 47 48 49 52 55 56 57 59 60 61 62 63 67 70 71 72 74 75 76 77 78 79 80 82 83 84 86 88 89 90 94 97 98 99 102 105 106 107 108 110 111 116 120 123 125 127 128 129 130 131 134 138 140 141 142 144 145 152 154 157 161 163 164 165 167 168 174 176 178 180 188 189 193 194 195 196 197 198 199 200 202 203 204 205 209 211 212 214 215 218 219 222 223 224 227 233 236 238 241 245 246

28. 1 8 9 10 11 12 16 18 19 25 27 29 30 32 36 37 39 40 41 45 49 50 52 55 56 57 59 61 62 68 69 70 72 73 74 77 78 79 80 82 83 85 88 92 94 95 96 98 99 102 106 108 109 110 114 117 119 120 121 122 125 127 128 130 135 136 137 138 141 144 153 159 161 164 166 167 168 169 170 173 174 175 179 182 183 185 188 189 190 191 192 193 195 198 199 202 203 205 206 210 213 214 215 220 221 223 224 225 226 227 230 233 235 236 237 239 242 243 247 248 249

29. 1 2 4 5 6 7 14 15 16 18 19 20 21 23 24 27 28 30 36 37 38 39 40 47 49 50 52 54 56 57 58 60 63 64 66 69 73 74 75 76 77 78 81 82 84 86 88 89 91 92 94 95 96 101 102 103 105 106 107 108 112 117 118 120 122 124 125 126 128 134 135 136 140 142 143 144 145 149 150 151 152 156 157 158 159 162 165 169 170 171 172 173 174 175 176 182 185 187 191 193 194 195 200 202 204 205 209 210 211 212 215 216 217 218 221 225 227 228 230 231 232 233 234 235 236 239 240 242 243 244 245 247 249

30. 4 6 7 9 11 13 18 19 20 23 28 29 31 33 35 36 37 41 42 43 46 47 48 49 51 52 54 58 59 62 66 70 71 72 73 74 75 76 77 78 82 83 88 89 92 93 95 96 97 98 99 100 101 103 104 110 111 113 117 121 122 123 124 126 127 129 135 137 141 142 145 146 151 152 153 155 160 162 163 165 168 169 171 172 173 174 176 177 179 180 181 182 184 185 186 188 189 194 195 200 201 203 204 205 207 209 210 211 213 216 217 223 230 234 236 241 243 248

31. 1 2 9 10 12 14 16 18 20 21 22 24 26 30 33 34 35 36 37 38 41 45 51 52 53 58 60 61 65 68 69 71 73 75 78 79 80 81 82 84 86 89 90 92 96 100 103 104 106 107 109 110 111 121 122 124 125 127 128 129 130 133 135 136 138 139 140 141 142 143 144 146 149 151 152 154 155 158 160 161 162 163 165 167 168 169 170 177 180 182 184 190 191 193 195 196 197 200 201 203 204 205 207 208 212 213 215 216 218 219 220 223 227 228 230 233 234 235 240 241 243 244 245 248 249

32. 3 5 8 15 17 19 21 22 24 27 28 34 36 39 40 46 47 54 55 61 62 63 65 66 67 68 71 72 73 75 76 77 78 79 80 82 84 86 93 95 96 98 100 103 104 112 113 114 115 121 122 123 132 133 134 135 136 139

140 142 143 144 145 147 149 150 152 153 157 158 159 160 165 166 167 169 174 175 177 178 182 183 185 190 191 194 196 197 203 204 206 207 208 209 210 213 215 217 218 219 222 224 225 226 227 229 233 236 237 244 245 247 248 250

33. 1 2 6 7 9 11 12 14 15 21 22 23 24 25 30 31 35 37 43 44 45 46 47 48 49 51 52 54 59 60 62 63 65 66 68 69 73 75 76 81 83 84 86 91 94 97 100 101 102 107 108 109 110 111 112 113 115 116 117 118 119 120 128 131 132 133 136 138 146 150 155 160 164 165 169 171 174 175 177 178 179 180 183 186 187 191 194 195 198 200 203 204 205 206 207 213 216 217 218 219 220 221 222 223 224 226 228 230 233 235 236 241 247 249 250

34. 2 3 4 6 8 9 11 12 15 16 17 19 20 21 25 27 31 32 37 38 40 41 43 46 48 49 50 52 54 56 57 58 63 65 66 67 69 71 74 76 80 82 83 84 85 86 87 88 90 92 96 99 100 103 105 106 107 109 110 111 113 116 118 120 121 122 123 124 125 128 130 131 132 133 135 136 141 144 147 149 151 152 153 154 155 157 158 162 163 165 166 169 170 174 175 176 179 180 181 182 183 184 185 187 189 190 192 193 198 199 200 201 202 204 205 206 207 210 211 212 213 215 216 217 220 221 222 223 224 226 227 228 229 230 231 233 235 237 240 243 244 245 246 247 248 249

35. 1 3 6 8 9 11 13 16 18 19 20 22 25 30 31 33 37 38 39 40 43 44 45 46 49 50 52 54 59 60 63 64 65 66 67 71 74 76 77 78 79 80 82 84 85 86 88 89 90 95 96 97 98 99 101 102 103 106 109 112 113 114 116 118 123 126 127 128 132 135 137 138 139 141 142 146 147 150 155 156 157 160 161 163 164 167 168 170 171 172 177 182 183 184 185 186 191 192 193 199 200 201 203 206 207 208 209 210 214 215 216 217 225 228 229 230 233 237 240 244 247 248 249 250

36. 1 2 4 5 6 7 10 13 14 16 17 18 19 22 23 24 25 27 28 29 30 31 32 39 41 42 43 45 48 52 54 55 57 60 64 65 67 68 69 71 72 73 75 79 81 87 89 90 92 93 94 95 99 100 101 102 103 104 105 108 110 112 114 115 116 117 118 121 122 123 124 125 126 129 130 131 132 134 137 139 140 142 149 151 152 153 155 156 157 164 167 172 173 175 176 179 180 182 185 187 188 190 196 197 200 204 205 206 209 211 215 218 220 221 222 223 226 227 229 230 231 232 234 236 237 239 241 242 243 244 245 247 249 250

37. 3 4 8 10 11 12 13 16 17 20 22 23 24 26 28 29 30 31 33 34 35 39 41 42 43 44 46 48 49 50 51 52 53 55 56 57 58 59 60 61 62 67 69 70 71 73 74 75 77 78 79 85 89 90 91 93 94 96 97 99 101 102 103 104 107 108 110 111 112 113 117 119 127 128 130 131 132 135 138 139 140 141 144 146 147 148 149 150 151 153 154 156 157 161 162 163 167 169 172 173 174 176 178 179 181 182 186 187 189 190 193 194 195 196 201 204 205 207 208 211 212 213 214 219 220 221 222

225 227 228 230 237 239 240 242 248

38. 2 6 13 16 25 26 29 31 34 35 40 42 45 47 50 54 55 57 58 60 66 69 75 77 78 79 81 82 86 88 89 91 93 95 96 98 99 101 104 106 110 111 112 115 116 118 123 124 126 127 128 131 134 138 139 141 142 144 145 149 151 152 153 156 157 158 161 163 164 167 169 171 175 176 177 179 183 184 186 188 191 194 195 196 198 200 201 202 207 208 209 211 212 213 214 215 224 227 228 229 230 231 232 233 234 235 236 237 239 241 242 246 247

39. 2 8 13 15 17 24 27 28 29 32 35 36 37 41 44 47 49 50 51 52 57 58 61 66 69 70 71 75 76 79 80 82 83 84 86 87 89 94 97 99 100 102 104 106 107 109 111 112 113 114 115 116 117 120 124 125 127 128 129 130 131 132 134 135 137 138 139 140 141 142 143 145 146 148 151 154 155 157 159 161 162 163 165 167 169 171 173 174 176 178 179 181 187 189 191 194 195 196 198 202 203 204 208 209 213 215 218 221 224 225 226 227 228 229 230 233 235 238 239 240 248 249 250

40. 1 4 5 6 9 10 11 12 13 15 21 23 28 29 32 34 35 38 42 49 51 53 54 55 60 61 64 68 70 71 73 74 75 79 81 82 83 84 85 86 90 92 94 99 100 102 103 105 106 107 109 113 114 116 121 122 124 128 131 132 133 134 136 137 138 139 141 142 144 146 148 151 154 155 157 158 160 161 162 163 164 165 166 167 171 172 173 174 175 176 177 178 179 180 181 182 183 185 186 188 191 192 193 196 197 200 201 203 204 205 207 208 209 212 215 216 218 220 228 229 230 231 232 234 235 236 237 238 239 240 241 242 245 246 247 249 250

41. 2 5 6 7 8 10 11 14 17 18 19 20 22 24 25 26 27 28 30 31 34 36 37 39 44 47 48 53 55 56 58 61 62 63 64 65 68 69 70 72 74 75 77 80 81 83 85 86 88 94 95 97 98 99 100 104 106 107 108 110 111 112 115 117 118 119 120 121 123 126 130 131 133 138 139 143 147 148 150 151 152 153 154 158 160 162 163 164 165 166 167 168 169 170 172 174 177 180 185 186 188 190 191 192 193 197 201 204 206 207 208 210 211 216 219 224 227 229 231 232 238 240 241 242 243 244 245 246 247 248 250

42. 1 3 5 8 10 11 12 13 14 17 19 20 21 22 23 26 30 36 37 38 40 44 45 46 47 48 49 53 55 56 57 58 59 63 64 65 66 67 68 69 70 73 76 78 79 80 81 82 85 86 91 92 95 97 101 104 105 107 109 113 114 123 125 128 131 132 133 134 136 138 139 140 141 143 145 146 149 151 152 154 156 158 159 160 162 163 164 167 170 172 173 174 176 180 181 182 183 185 189 191 192 194 195 197 199 203 204 205 208 211 212 213 214 216 217 220 225 227 228 229 230 233 234 236 238 239 241 242 243 244 246 247

43. 1 2 4 7 9 10 13 14 15 16 17 18 19 21 23 25 30 33 34 35 36 37 46 47 51 52 53 55 56 57 59 60 61 66 69 70 73 74 75 78 80 81 82

83 84 85 87 89 92 93 95 97 98 99 100 102 103 104 106 108 109 112 124 125 126 127 135 140 143 144 145 148 155 156 157 160 161 162 163 164 165 167 171 173 174 175 177 180 181 182 183 185 186 188 189 191 192 193 195 196 198 200 201 202 205 207 213 220 221 225 227 228 231 232 234 235 236 237 241 242 243 245 249 250

44. 1 2 3 4 5 6 7 8 9 11 12 14 15 16 18 21 33 35 37 39 41 42 45 47 53 54 56 58 59 61 62 63 64 66 67 68 69 73 74 75 77 80 84 85 86 87 88 89 93 94 95 96 97 99 101 103 104 106 111 112 114 115 116 117 119 121 123 126 127 128 130 131 132 139 140 141 142 144 146 149 152 155 156 157 161 162 165 166 174 180 181 183 184 185 187 188 189 190 192 194 200 202 205 206 207 209 213 217 220 221 222 224 225 229 230 232 233 234 235 241 243 244 245 246 248 250

45. 2 4 7 8 11 12 13 14 21 24 25 26 27 28 31 33 35 36 38 42 44 46 49 50 51 54 56 57 59 61 63 64 65 70 72 73 75 76 77 78 82 84 85 86 87 89 91 93 94 99 102 103 104 108 109 117 118 119 120 122 126 128 130 132 134 135 137 138 139 141 142 144 147 149 152 153 160 161 162 164 165 166 170 171 173 178 181 184 185 188 190 192 195 197 198 202 205 206 213 219 220 221 222 226 227 228 229 233 234 235 237 238 241 242 247

46. 2 3 4 6 7 8 10 11 12 13 14 17 18 20 22 23 24 25 26 27 30 32 33 34 35 37 42 43 45 47 48 49 50 51 55 56 58 62 64 65 66 67 68 70 71 72 73 75 78 80 84 85 86 88 89 90 91 92 94 97 98 104 106 107 110 111 114 119 120 122 123 124 125 127 128 129 130 131 133 135 137 139 140 142 145 147 148 150 153 154 156 157 158 160 161 163 164 165 166 168 169 170 171 174 176 177 182 183 190 192 193 194 195 196 197 198 202 206 207 208 210 211 212 215 216 217 218 220 222 226 227 229 230 231 233 238 240 242 243 244 245 246 247 249 250

47. 2 3 4 8 9 11 12 17 19 21 26 27 29 30 32 33 38 39 41 42 43 44 46 48 50 53 55 56 57 58 60 62 64 65 66 69 72 73 74 75 77 81 83 85 86 89 91 94 95 96 97 99 103 104 106 111 114 115 116 119 120 122 129 134 135 137 138 139 140 142 144 145 146 147 150 154 155 167 170 172 174 175 177 182 183 184 185 186 187 189 190 192 193 198 199 203 204 205 206 207 208 210 212 213 215 217 220 223 224 227 228 229 232 235 236 237 238 241 242

48. 4 5 6 8 9 11 12 13 14 15 16 18 19 20 21 24 25 26 27 30 33 34 36 37 41 42 46 47 50 52 53 54 55 56 57 58 60 61 62 63 69 74 76 77 78 80 81 82 83 87 92 95 96 99 103 105 106 107 108 109 110 112 113 115 117 118 123 124 125 126 127 129 130 132 135 136 137 142 144 146 148 150 151 158 159 161 162 163 164 170 173 175 176 178 179 183 185 187 189 191 194 196 197 202 204 205 206 207 210 211 214 216 217 219 221 223 225 226 229 231 236 237 238 239 242 245

246 247 248 249 250

49. 2 3 5 6 7 9 13 14 15 16 17 21 22 23 27 28 29 30 33 34 35 37 39 40 42 45 46 57 59 60 62 63 64 67 69 71 73 81 82 87 89 91 92 95 96 100 105 107 108 111 113 116 117 122 124 127 129 131 133 134 136 137 139 142 144 147 149 151 154 156 162 164 166 167 170 172 173 174 175 176 178 180 181 182 183 184 186 187 190 193 194 195 196 199 203 204 205 206 207 208 209 210 216 219 221 222 227 229 231 232 235 236 237 239 241 245 246 247 248 249 250

50. 2 3 6 13 14 15 16 17 19 20 21 24 25 26 28 29 34 35 37 38 39 45 46 47 48 54 65 66 72 75 78 79 80 81 83 85 87 89 90 92 94 96 97 98 99 103 107 109 112 113 114 116 120 121 125 127 129 131 133 134 136 140 142 143 144 146 150 152 153 158 161 164 166 169 170 172 177 178 180 181 185 186 188 189 191 192 193 196 200 201 202 203 204 205 206 208 209 212 218 219 222 224 227 229 230 231 232 233 235 237 241 242 244 245 247 248 249

51. 1 2 6 7 9 12 13 14 16 17 24 25 30 31 33 37 39 40 43 45 46 52 53 58 59 60 61 62 64 66 67 68 69 71 73 78 81 83 85 86 87 88 89 91 94 95 100 101 104 105 106 108 109 110 113 114 115 116 117 119 120 121 122 126 128 129 132 136 140 141 142 143 147 148 150 151 155 156 157 158 161 164 167 169 171 173 175 179 181 183 184 185 189 190 191 193 194 195 197 200 201 202 205 207 210 211 212 213 217 219 220 221 222 223 224 226 228 229 233 240 241 249 250

52. 5 6 8 11 12 16 19 20 21 24 25 27 28 29 30 31 33 34 35 36 37 39 43 48 51 54 55 56 64 65 66 67 68 75 76 78 80 81 87 88 90 92 94 95 96 100 101 103 104 105 107 108 109 110 111 112 113 115 117 120 121 123 124 127 128 129 133 135 138 141 143 145 148 150 154 155 156 157 160 161 162 164 166 168 169 170 172 175 176 179 180 181 183 184 191 192 194 195 196 197 199 207 210 211 216 219 221 226 230 231 232 234 235 236 237 238 240 244 245 247 249

53. 1 2 4 7 9 12 13 15 16 18 19 25 26 31 37 40 41 42 43 44 47 48 51 54 55 57 59 62 68 70 72 75 76 77 78 81 82 83 88 90 92 93 95 96 97 98 100 101 102 106 107 109 110 114 115 117 118 120 121 122 123 124 125 128 129 131 132 133 137 138 140 141 143 145 146 147 148 151 153 154 155 158 159 162 164 165 167 168 170 172 173 176 177 178 179 180 183 185 190 191 194 195 200 202 203 204 205 207 208 209 210 214 216 217 219 221 222 223 225 227 230 232 236 237 238 239 240 241 249

54. 2 3 5 7 11 12 14 17 19 21 22 23 24 25 26 29 30 32 33 34 35 36 38 40 44 45 48 50 52 53 55 72 74 75 76 77 79 80 81 83 84 85 88 92 93 94 95 110 112 114 116 119 120 121 123 125 126 127 130 131 132 134 136 139 140 142 143 144 145 148 150 153 154 158 159 160 161 164 166 167 170 172 176 178 180 182 183 184 185 187 188 192

194 198 199 201 206 208 210 213 214 215 219 220 224 227 229 231 232 234 237 238 240 245 246 247 250

55. 1 2 4 6 10 11 13 14 19 20 21 22 24 27 28 32 36 37 38 40 41 42 43 46 47 48 52 53 54 56 59 62 66 67 69 74 77 78 80 81 82 83 84 85 86 87 89 90 93 94 95 96 97 98 100 103 104 105 106 109 113 115 121 123 124 127 128 130 132 134 137 138 139 140 142 143 146 147 148 149 150 157 158 159 161 162 163 165 166 172 174 176 177 178 179 182 183 185 186 187 188 193 194 195 196 197 202 203 209 210 211 212 215 218 219 220 221 222 223 224 225 230 231 232 238 239 241 242 245 246 248 249 250

56. 3 4 7 8 9 13 14 18 20 21 22 23 26 27 28 29 34 37 41 42 43 44 45 46 47 48 52 55 58 59 60 62 64 67 68 72 76 80 81 84 87 88 91 94 95 96 97 100 101 104 105 106 109 110 111 113 114 116 117 118 119 120 121 128 133 137 138 140 144 146 147 149 152 153 157 158 159 162 164 166 167 169 171 172 175 177 178 180 181 182 184 185 186 187 188 189 192 195 196 212 213 214 216 218 219 220 225 226 227 229 233 236 246 247 249

57. 2 6 8 11 13 18 19 22 24 25 27 28 29 34 36 37 38 39 42 43 45 47 48 49 53 58 59 61 62 65 71 72 73 74 76 77 78 79 81 83 84 85 86 87 88 92 94 99 100 101 102 104 105 106 112 115 119 121 123 127 129 130 134 136 137 140 143 145 147 148 153 154 156 159 160 164 166 167 169 171 172 174 178 182 183 184 187 188 193 195 196 198 199 201 204 205 207 211 212 214 218 220 221 224 226 228 231 232 234 235 237 240 241 243 245 246 248 249

58. 5 7 8 9 10 13 14 17 18 19 23 24 25 29 30 31 34 37 38 39 41 42 44 46 47 48 51 56 57 63 67 68 70 71 72 73 76 77 79 81 82 85 88 89 91 92 93 94 99 103 104 107 108 110 112 113 114 116 119 125 126 130 133 139 140 143 146 147 149 150 158 159 160 163 168 169 173 174 175 176 178 179 181 183 185 188 190 192 194 195 197 200 202 204 208 209 211 213 215 216 218 219 221 223 226 227 229 230 231 232 233 234 238 240 241 243 247 250

59. 4 7 9 10 14 15 18 19 23 24 25 27 28 30 33 35 37 42 43 44 45 49 51 53 55 56 57 63 64 65 66 68 72 73 74 78 79 80 81 82 84 86 89 90 92 93 97 98 101 103 104 108 112 113 114 115 116 117 118 120 121 122 123 125 130 133 134 142 143 147 148 150 151 152 154 155 158 161 164 165 166 169 171 172 174 176 177 183 189 191 192 193 195 196 197 198 199 203 204 205 207 208 211 212 219 221 222 229 230 231 232 234 237 238 239 241 244 248 249

60. 1 2 3 5 9 10 12 14 15 16 20 21 25 26 27 29 31 33 35 36 37 38 40 43 47 48 49 51 56 61 62 65 68 73 75 78 81 82 84 85 86 88 89 91 93 98 100 101 102 104 105 106 109 110 111 112 113 115 118 119 121 122 123 124 129 131 133 134 137 138 140 142 143 144 145 146

148 149 150 151 154 155 156 162 167 169 170 171 173 174 176 177 182 185 188 189 190 191 197 200 202 204 205 207 209 212 213 214 216 217 218 219 220 221 223 226 227 229 230 233 236 237 238 239 240 241 242 245 246 247 248

61. 5 6 7 8 12 13 14 16 17 22 23 24 25 26 27 28 31 32 37 39 40 41 43 44 45 48 51 57 60 62 63 65 67 73 75 76 78 80 82 83 87 88 91 94 95 97 100 102 104 105 108 112 115 117 118 119 122 124 130 131 134 135 138 139 140 143 144 145 147 152 154 155 157 158 159 161 165 170 176 178 179 180 181 182 190 191 193 194 195 199 203 204 207 209 210 216 218 220 221 223 224 225 226 229 231 232 233 236 237 238 239 240 242 243 244 250

62. 1 2 3 5 6 9 12 15 16 17 20 23 24 25 27 28 30 32 33 37 41 44 46 47 48 49 51 53 55 56 57 60 61 70 72 75 80 82 83 84 86 87 89 90 93 94 95 97 99 100 102 103 104 108 110 113 116 120 122 123 124 126 127 131 132 133 134 138 139 141 144 145 146 150 151 152 153 156 158 160 161 163 165 167 168 170 171 173 174 177 178 181 182 183 185 186 188 189 192 193 195 196 197 199 201 202 209 212 213 215 217 219 224 225 228 229 230 231 233 236 237 238 240 242 243 244 246 247 249 250

63. 1 3 5 8 9 11 12 14 15 16 17 18 19 21 24 25 27 29 32 33 34 35 41 42 44 45 48 49 58 59 61 65 66 67 68 70 72 74 77 79 83 84 86 91 92 95 96 98 100 101 102 103 104 105 106 107 112 114 115 116 118 119 128 130 131 133 138 140 141 143 144 147 151 152 153 155 161 162 165 166 168 174 175 177 178 181 183 184 186 187 188 189 190 192 195 196 197 199 208 209 210 211 212 213 217 218 219 221 222 223 224 226 227 228 232 233 236 237 240 241 242 243 250

64. 2 3 5 7 8 10 11 12 13 15 16 20 22 23 24 25 26 29 35 36 40 41 42 44 45 46 47 49 51 52 56 59 69 72 73 76 78 82 83 87 90 91 95 96 98 101 102 106 110 112 113 114 115 117 119 122 123 124 129 130 136 140 141 142 143 144 148 149 150 151 152 153 154 155 157 158 161 162 164 166 168 173 177 179 180 181 185 187 189 191 192 195 196 199 200 203 204 207 209 210 216 217 218 223 224 226 229 231 234 235 239 245 246

65. 10 12 16 17 20 22 23 24 25 26 31 32 33 34 35 36 41 42 45 46 47 50 52 57 59 60 61 63 68 70 72 73 74 75 77 81 82 83 84 85 87 88 91 92 94 95 98 99 100 102 104 107 109 110 115 119 122 126 128 129 130 131 133 134 135 137 138 139 141 142 143 144 145 149 150 153 154 156 158 159 165 166 169 170 171 173 174 176 177 178 182 183 184 186 188 189 190 191 193 194 195 199 200 201 205 206 209 214 215 216 217 220 221 222 224 226 231 232 234 235 236 238 240 242 243 246 250

66. 1 2 3 4 6 8 9 10 14 16 17 23 24 25 29 30 32 33 34 35 38 39

42 43 44 46 47 50 51 52 55 59 63 67 68 70 72 73 76 79 81 82 86 87 89 93 96 97 100 101 102 103 105 111 114 115 116 119 120 122 124 125 130 132 133 140 143 144 148 149 150 151 153 154 155 157 158 159 165 166 167 169 170 171 175 176 177 179 180 182 186 187 189 195 196 201 205 208 209 213 215 217 221 222 230 234 236 237 238 239 242 243 244 245 246 247 248

67. 2 3 4 5 8 9 10 11 12 14 17 18 20 21 23 24 25 26 27 32 34 35 36 37 42 44 46 49 51 52 55 56 58 61 63 66 69 72 73 76 78 79 80 81 82 83 85 87 88 91 94 96 98 103 110 113 116 117 118 119 120 124 125 127 128 129 130 132 133 134 135 137 138 140 141 143 144 149 152 155 159 161 162 163 164 167 168 169 170 173 174 176 177 179 180 185 186 188 190 191 193 194 195 198 200 206 207 208 209 210 212 213 215 218 219 222 223 224 225 228 229 230 231 234 235 237 243 246 247 248 249

68. 1 2 5 10 15 16 18 19 20 25 28 31 32 33 36 40 41 42 44 46 51 52 53 56 58 59 60 63 65 66 69 70 71 72 77 80 81 82 83 85 87 88 90 93 94 97 98 100 102 103 104 106 108 111 114 115 116 118 121 122 123 126 127 129 131 132 133 136 138 139 140 142 144 145 146 147 148 149 150 151 152 153 154 156 158 159 161 165 167 168 169 173 174 176 177 181 184 187 188 189 193 195 201 203 204 208 209 210 212 213 215 216 217 218 219 223 224 225 230 234 235 236 237 239 241 243 244 246 248

69. 5 6 7 11 14 15 16 17 18 19 21 24 25 26 28 29 31 33 34 36 37 38 39 41 42 43 44 47 48 49 51 55 64 67 68 73 75 77 78 80 81 85 87 93 97 100 101 102 103 104 106 109 110 111 114 115 116 119 123 124 125 126 127 128 131 133 137 139 140 141 145 148 149 150 151 152 154 156 159 161 162 164 169 170 173 174 177 178 179 181 183 184 187 190 191 192 194 198 200 201 202 205 206 208 209 210 211 212 214 215 218 221 227 230 231 233 236 238 239 241 242 243 244 245 246

70. 1 2 3 4 5 7 8 9 10 11 12 16 17 19 21 22 25 26 27 28 30 37 39 40 41 42 43 45 46 53 58 62 63 65 66 68 71 72 75 79 80 82 83 88 90 91 94 95 96 98 99 100 101 102 103 105 108 110 111 112 114 116 117 118 119 120 122 123 124 126 127 128 129 131 132 133 135 136 138 140 142 146 149 151 153 156 158 159 162 164 171 172 173 174 178 179 181 183 187 189 191 192 193 196 199 200 201 207 209 210 211 212 213 214 215 217 218 220 221 223 225 228 230 231 233 237 239 241 242 244 246 250

71. 1 2 5 6 8 9 11 13 15 17 18 20 21 22 24 26 27 30 31 32 34 35 36 37 39 40 46 49 51 57 58 68 70 74 76 77 80 81 83 86 87 88 90 94 95 97 98 100 103 104 105 107 108 110 112 113 115 116 121 125 126 129 130 132 137 141 143 146 151 153 154 157 162 164 165 166

167 169 174 175 177 178 180 182 184 185 186 187 191 193 195 196 197 199 200 201 203 206 208 209 213 214 220 222 223 224 225 226 227 232 233 235 239 240 241 243 245 246 247 248

72. 1 3 5 6 9 13 19 20 21 22 24 26 27 28 30 32 36 41 45 46 47 50 53 54 56 57 58 59 62 63 64 65 66 67 68 70 73 74 75 76 77 80 81 82 84 87 89 90 91 93 97 98 100 101 102 103 104 105 106 107 108 109 110 111 112 117 119 121 123 125 126 128 130 132 134 135 136 138 141 142 143 144 146 147 149 150 152 154 155 156 157 158 159 162 163 165 168 172 174 176 180 181 182 186 187 191 194 195 196 197 200 201 202 206 208 212 215 216 219 220 221 225 227 228 229 239 240 242 247 249 250

73. 2 4 6 9 11 13 15 16 17 21 23 25 26 28 29 30 31 32 33 36 37 40 42 43 44 45 46 47 49 51 57 58 59 60 61 64 65 66 67 69 72 79 81 82 84 85 86 87 88 94 95 98 100 101 102 103 105 110 111 112 114 115 119 120 125 128 129 130 132 135 137 139 141 142 144 146 147 148 151 153 154 157 158 159 160 162 164 167 170 173 174 176 177 178 180 182 184 186 189 190 191 192 193 194 195 196 201 203 206 207 208 210 211 213 214 215 217 218 221 223 224 225 230 232 233 235 236 237 239 241 242 244 245 247 250

74. 1 2 3 5 9 10 14 15 16 17 19 20 22 23 24 27 28 29 30 34 35 37 40 41 43 44 47 48 54 55 57 59 63 65 71 72 75 78 79 81 85 86 87 95 96 99 101 102 103 104 107 110 111 113 114 117 118 123 124 128 129 130 131 132 133 136 138 139 144 146 147 148 149 150 151 152 154 155 156 157 160 162 163 165 168 169 170 171 172 174 176 178 182 183 185 188 189 191 194 196 197 201 203 205 209 210 212 213 215 216 218 219 220 221 222 225 226 230 232 233 237 239 241 246 248

75. 1 4 7 12 13 16 17 20 22 23 24 25 26 27 29 30 31 32 33 36 37 38 39 40 41 43 44 45 46 47 50 52 53 54 60 61 62 65 69 70 72 74 77 85 88 89 90 91 96 99 101 102 105 106 108 109 112 115 116 119 124 125 126 127 128 130 132 134 136 139 141 142 144 145 146 147 150 152 153 154 161 163 164 170 172 175 176 177 178 179 183 184 185 191 192 194 195 202 203 204 206 213 215 217 220 222 223 224 225 228 229 233 235 237 245 247 248

76. 2 4 7 9 10 11 14 17 19 20 21 23 24 26 27 29 30 32 33 34 35 39 42 45 48 52 53 54 56 57 58 61 64 66 67 71 72 77 78 80 81 82 83 86 87 89 90 92 93 96 98 99 100 106 110 113 114 120 122 123 128 130 131 132 133 135 136 138 140 141 146 148 152 153 156 160 162 163 165 168 169 170 171 172 178 183 188 190 197 198 200 201 205 206 207 208 212 213 215 217 218 219 220 221 223 228 229 230 233 234 236 239 240 243 247 248

77. 1 7 8 12 13 14 16 17 19 23 26 27 28 29 30 32 35 37 38 41

44 45 47 48 53 54 55 57 58 63 65 68 69 71 72 75 76 78 80 82 83 84 86 88 92 93 94 95 97 101 104 105 109 110 112 113 114 116 118 123 126 127 133 135 138 142 143 147 148 151 156 157 159 160 161 162 164 165 166 168 169 170 173 174 176 179 180 181 182 183 184 185 186 188 189 192 193 195 199 203 206 208 210 211 214 215 216 217 218 221 223 229 230 231 232 235 237 240 242 244 245 246

78. 1 2 4 5 6 8 9 13 15 16 18 21 23 26 27 28 29 30 31 32 35 37 38 42 43 45 46 48 50 51 52 53 55 57 59 60 61 64 67 69 74 76 77 79 80 81 82 83 86 89 90 95 96 98 99 101 106 107 108 111 112 113 116 118 119 121 128 129 130 131 133 136 137 140 143 151 154 156 159 160 161 168 169 172 174 175 176 177 178 179 180 181 182 184 185 186 189 190 191 192 193 194 195 197 199 200 201 204 206 208 209 213 214 215 216 217 218 221 222 223 227 228 230 232 235 237 239 241 244 245 247

79. 3 5 6 8 9 10 11 14 20 23 24 25 26 27 28 31 32 35 36 37 38 39 40 42 50 54 57 58 59 63 66 67 70 73 74 78 80 82 83 86 88 89 91 92 93 95 97 99 101 102 103 104 108 109 111 112 116 118 119 128 129 130 131 133 136 142 143 146 149 151 152 154 155 156 158 159 160 164 165 166 169 178 179 180 182 183 184 186 187 188 193 195 198 199 200 201 203 204 206 207 208 209 211 212 213 218 219 220 222 225 227 229 230 232 233 236 237 238 239 240 241 243 245 246 247 248 249

80. 1 3 5 6 7 8 10 13 16 17 18 21 27 28 31 32 34 35 39 41 42 43 44 46 48 50 52 54 55 56 59 61 62 67 68 69 70 71 72 76 77 78 79 81 83 89 90 93 94 95 98 100 101 103 106 112 113 114 115 117 118 120 122 126 127 130 131 133 137 139 140 141 143 144 145 146 148 149 150 151 152 157 158 160 166 171 173 174 177 178 180 183 185 186 187 188 192 194 197 198 200 201 202 204 208 210 211 213 214 215 217 220 221 222 223 226 230 233 235 238 240 241 242 245 247 248

81. 1 6 9 10 11 12 13 15 18 20 22 25 29 31 33 36 38 40 41 42 43 47 48 49 50 51 52 53 54 55 56 57 58 59 60 65 66 67 68 69 71 72 73 74 76 78 80 83 84 85 87 88 89 90 91 92 93 96 99 103 107 109 110 111 113 114 116 117 118 121 123 124 125 126 127 133 134 135 136 139 144 148 149 151 152 154 155 160 161 165 169 170 171 172 173 175 176 179 181 187 190 195 198 199 200 205 206 207 210 211 212 213 216 219 221 224 228 230 232 235 237 238 239 242 244 245 248 250

82. 2 3 13 17 18 19 21 22 23 24 27 28 29 30 31 32 34 35 38 39 40 42 43 45 48 49 53 55 58 59 60 61 62 64 65 66 67 68 70 72 73 76 77 78 79 84 85 87 88 89 93 94 96 105 106 107 110 112 114 116 117 118 120 121 122 124 125 126 127 128 134 135 140 143 146 147 148

151 155 156 158 162 164 165 166 167 172 174 175 176 177 178 182 185 187 191 192 195 201 207 208 216 217 218 219 220 221 223 224 230 232 233 234 241 243 245 248 249

83. 1 3 5 7 8 10 11 14 16 17 21 22 24 25 26 27 28 30 33 34 39 40 41 43 47 48 50 51 53 54 55 57 61 62 63 64 65 67 68 70 71 76 77 78 79 80 81 84 86 89 95 96 100 101 102 104 105 107 110 118 119 121 122 123 125 127 129 130 131 132 134 135 136 137 139 140 141 143 144 146 150 154 155 158 159 163 167 168 169 172 174 175 178 183 185 187 190 191 195 198 202 203 204 205 206 207 208 209 211 213 215 219 220 223 224 226 228 229 231 232 233 239 240 242 245 247 248

84. 1 2 10 12 13 14 17 19 20 21 25 27 29 31 32 33 34 35 39 40 43 44 45 46 54 55 56 57 59 60 62 63 65 72 73 77 81 82 83 88 89 90 92 94 106 107 108 113 114 115 119 120 121 128 131 132 133 134 135 136 137 138 139 140 141 143 145 147 148 151 155 157 161 162 164 166 169 170 172 174 175 176 177 179 180 182 183 184 185 188 191 194 195 196 198 200 203 204 205 209 211 212 213 214 219 221 226 228 230 233 234 235 236 237 238 239 242 243 245 248 249 250

85. 2 4 7 8 9 11 12 15 16 17 18 20 24 26 28 34 35 37 40 41 42 43 44 45 46 47 50 51 54 55 57 58 60 65 67 68 69 73 74 75 81 82 87 88 92 94 96 98 99 102 104 105 108 114 115 119 120 121 123 124 126 128 130 131 132 133 134 136 137 138 139 140 141 143 144 145 146 147 148 149 153 154 156 158 159 164 168 170 171 177 178 179 183 184 185 186 188 193 195 196 197 200 202 203 204 205 206 207 208 211 214 215 216 217 218 220 221 222 223 226 227 229 230 231 232 238 239 240 242 243 246 247 248

86. 3 4 5 7 9 10 11 13 15 16 17 21 22 24 25 27 29 31 32 33 34 35 38 39 40 41 42 44 45 46 47 51 55 57 59 60 62 63 66 71 73 74 76 77 78 79 83 87 88 91 92 94 95 96 98 99 101 103 105 106 108 109 110 113 114 115 118 121 122 124 129 132 133 134 135 139 140 142 143 145 147 148 153 155 157 167 168 172 174 175 176 177 180 182 184 185 186 188 190 191 192 193 194 195 196 197 198 199 204 205 206 210 211 213 217 220 221 224 225 227 228 229 230 236 238 239 242 244 245 246 248 249

87. 1 3 5 6 7 9 11 13 14 16 18 19 21 22 26 34 36 39 43 44 45 48 49 50 51 52 55 56 57 61 62 64 65 66 67 68 69 71 72 73 74 76 81 82 85 86 89 90 91 94 95 96 100 102 105 106 107 112 113 115 118 120 121 125 126 128 129 134 135 139 140 141 143 144 147 149 150 154 155 157 158 161 165 167 170 171 173 174 175 177 179 180 183 184 190 191 192 193 194 199 200 201 205 206 207 210 211 212 218 220 222 225 227 228 229 231 232 233 237 239 240 243 244 247 248 249 250

88. 1 2 3 4 5 9 11 12 13 15 19 21 24 25 27 28 29 30 34 35 38 41 44 46 51 52 53 54 56 57 58 60 61 65 67 68 70 71 73 75 77 79 81 82 84 85 86 92 93 96 97 98 100 102 103 104 105 106 107 109 110 112 119 121 123 124 126 127 128 132 133 134 135 138 140 144 147 150 153 154 157 158 160 162 165 166 167 168 170 171 173 175 179 180 181 182 183 184 185 188 189 191 192 193 195 196 197 198 199 200 202 205 208 213 217 218 219 220 221 222 225 229 236 237 241 242 246 250

89. 4 5 6 12 13 15 16 18 19 21 22 23 24 27 29 30 31 35 36 37 38 39 43 44 45 46 47 49 50 51 55 58 59 60 62 66 72 75 76 78 79 80 81 82 83 84 87 91 92 94 96 97 98 99 101 102 105 107 108 109 110 112 113 114 115 120 122 123 124 125 128 129 131 132 134 135 137 138 141 143 144 146 147 148 153 154 155 159 161 162 163 166 169 170 171 173 174 175 177 180 181 183 184 186 187 188 189 191 193 194 195 198 199 200 202 203 204 205 207 209 212 214 216 217 218 219 221 224 227 228 229 232 234 237 238 241 242 244 245 246 248 249 250

90. 5 7 8 10 11 13 16 19 21 22 23 24 25 27 31 34 35 36 37 40 46 50 52 53 55 59 62 64 68 70 71 72 75 76 78 80 81 84 87 93 95 96 97 98 99 101 103 107 111 114 115 118 119 123 125 127 128 130 131 132 134 135 137 138 139 140 141 142 143 144 145 146 149 150 151 152 156 157 160 163 165 167 168 169 171 172 173 175 176 177 178 181 182 187 190 191 192 196 198 200 202 203 206 208 209 210 212 218 221 225 229 231 233 236 237 238 241 243 244 248

91. 1 5 7 11 13 14 19 22 23 25 29 33 37 38 42 45 46 47 49 51 56 58 60 61 63 64 65 67 70 72 75 79 81 86 87 89 92 93 96 97 98 99 105 106 108 110 112 113 121 124 125 127 128 129 131 132 134 136 138 141 142 143 147 152 155 156 158 161 162 164 167 168 172 173 174 176 177 180 181 182 183 184 188 189 190 191 192 195 196 199 202 208 215 217 221 224 225 227 228 231 233 235 237 240 241 243 244 245 246 248

92. 2 3 5 9 10 12 13 14 17 18 19 20 21 22 24 25 28 29 30 31 34 36 40 42 43 46 48 49 50 52 53 54 57 58 59 63 65 76 77 79 81 84 85 86 88 89 91 95 96 99 104 105 106 108 110 111 112 117 120 124 127 130 132 133 136 137 139 142 145 148 149 151 152 153 155 159 161 162 163 165 169 171 173 174 178 180 181 183 184 186 187 188 192 193 194 195 197 199 200 202 203 209 212 213 214 215 217 218 221 223 224 227 228 229 230 231 236 239 240 241 242 244 245 248 249

93. 1 3 6 7 8 11 12 14 15 21 23 24 25 30 32 36 37 38 43 44 45 53 54 55 58 59 60 62 66 68 69 72 76 77 79 80 81 82 88 90 91 94 95 96 105 107 109 110 113 116 121 122 123 124 125 128 129 136 139 144 147 148 149 150 152 154 155 157 164 166 167 168 169 172 174

175 178 182 184 185 187 191 192 194 195 197 198 200 202 204 205 207 209 211 212 213 214 215 217 218 220 222 227 228 229 230 231 233 235 236 238 239 243 244 245 246 250

94. 1 3 5 7 8 9 11 14 17 21 22 27 28 29 33 36 37 39 40 41 44 45 46 47 50 51 52 54 55 56 57 58 61 62 65 67 68 70 71 73 77 80 82 84 85 86 87 89 93 97 101 103 104 105 106 107 113 117 127 128 130 131 132 133 134 135 136 139 141 142 143 144 145 147 149 150 151 153 155 156 157 158 159 164 166 167 169 170 173 174 177 180 181 182 185 187 188 189 192 194 196 198 204 211 213 214 216 217 218 221 222 223 228 229 230 231 233 236 237 241 244 247

95. 1 4 7 8 11 12 13 14 16 17 18 20 21 23 24 25 28 29 30 32 35 36 38 41 42 43 44 47 48 49 51 52 53 54 55 56 61 62 63 64 65 70 71 73 74 77 78 79 80 83 86 87 90 92 93 101 102 104 107 108 110 114 115 118 120 122 123 124 127 131 132 134 136 137 139 144 146 147 148 150 154 156 157 159 160 161 162 164 166 167 168 171 175 176 178 179 185 187 188 189 191 194 195 196 197 199 200 208 211 216 219 220 224 229 230 231 232 233 234 236 237 238 240 244 247

96. 1 3 6 8 9 11 14 16 18 19 21 24 25 26 28 29 30 31 32 34 35 37 38 44 47 48 49 50 52 53 55 56 63 64 66 67 70 74 75 76 78 81 82 83 85 86 87 88 89 90 91 92 93 97 99 101 102 103 106 107 109 110 115 116 117 125 128 129 130 134 136 137 138 139 141 144 149 150 152 154 156 159 163 164 166 167 168 169 170 171 173 176 178 179 180 181 182 184 187 190 194 195 196 197 198 199 201 202 205 206 208 210 212 215 219 220 223 225 226 231 232 234 236 238 240 241 242 243 244 245 246 249

97. 1 2 4 7 9 10 11 12 14 16 17 18 20 22 23 27 30 33 35 37 39 41 42 43 44 46 47 50 53 55 56 59 61 62 66 68 69 71 72 77 79 88 89 90 91 94 96 99 103 110 112 114 115 116 118 121 122 123 124 127 128 132 135 137 139 140 141 143 144 145 148 150 151 157 158 159 162 168 169 172 173 174 175 176 177 178 179 180 181 182 184 189 190 191 192 198 204 206 207 209 213 214 215 216 218 219 221 223 224 227 228 229 230 234 235 236 237 239 243 246 247 248

98. 2 4 6 8 9 11 12 14 15 19 20 23 27 28 30 32 35 38 41 43 46 50 53 55 59 60 63 64 65 67 68 70 71 72 73 76 78 80 85 86 88 89 90 91 99 100 102 103 104 106 107 112 114 116 120 124 125 126 127 128 129 131 132 134 136 137 138 140 141 143 145 148 149 150 151 154 155 157 158 159 164 165 167 168 170 172 173 175 177 178 181 183 185 186 190 191 192 193 194 196 198 199 200 201 204 205 206 210 211 212 213 214 216 217 218 219 220 221 223 224 228 232 233 236 237 239 241 245 248 249 250

99. 5 7 10 13 18 19 21 23 24 27 28 30 34 35 36 37 38 39 40 41 43 44 45 47 48 50 57 58 62 65 70 74 75 76 78 79 81 85 86 89 90 91

92 96 97 98 104 105 107 108 109 110 113 114 115 120 122 123 126 127 128 129 130 135 137 142 146 147 149 150 151 153 155 156 158 159 161 163 164 166 169 170 171 172 173 175 177 179 182 187 188 191 194 195 196 197 199 201 202 204 206 207 208 209 210 211 215 218 221 222 223 224 225 226 228 232 233 234 236 237 239 240 244 247

100. 1 2 4 7 8 9 10 11 13 14 15 16 20 21 22 23 24 25 26 30 31 32 33 34 36 39 40 41 43 49 51 52 53 55 56 57 60 61 62 63 65 66 68 69 70 71 72 73 76 80 83 87 88 98 103 106 108 109 114 115 116 117 118 119 126 127 129 130 132 136 139 145 146 147 150 151 157 158 161 163 167 172 173 175 177 178 179 183 184 185 186 187 188 189 190 196 198 199 202 213 215 217 218 219 223 224 226 227 230 231 237 239 245 247 248 249

101. 4 7 9 11 12 13 14 15 18 19 20 21 23 24 25 29 30 33 35 36 37 38 42 44 51 52 53 56 57 59 60 63 64 66 69 70 72 73 74 75 77 78 79 80 83 86 89 90 94 95 96 105 106 107 108 109 110 111 113 116 118 119 121 122 123 125 130 131 133 134 136 139 140 141 143 144 147 150 151 152 153 154 155 157 158 160 163 164 171 172 173 174 175 177 178 181 182 189 192 193 196 197 198 199 201 202 206 207 208 223 224 225 227 231 235 236 237 240 243 245 247 248 250

102. 3 5 6 10 12 14 17 19 23 24 25 26 27 28 29 33 35 36 37 39 40 43 45 53 57 60 61 62 63 64 65 66 68 69 70 72 73 74 75 79 83 85 87 88 89 95 96 98 103 110 111 112 113 114 118 120 122 123 125 127 128 129 130 132 134 135 137 141 142 143 145 146 149 151 152 153 156 157 158 160 161 163 165 167 171 173 174 176 179 181 183 184 186 189 192 193 194 197 206 207 208 210 211 214 215 216 218 219 221 222 225 226 230 231 233 234 237 238 239 242 244 245 247

103. 2 4 5 12 14 17 18 19 21 22 25 26 29 30 31 32 34 35 36 37 40 43 44 45 47 48 50 52 55 58 59 62 63 66 67 68 69 70 71 72 73 74 79 80 81 86 88 90 94 96 97 98 100 102 104 106 107 108 111 114 115 116 117 118 119 120 122 123 124 126 128 129 130 133 134 135 145 148 153 155 158 159 160 161 163 164 165 166 167 169 171 175 177 183 184 185 187 190 192 193 194 197 198 199 202 203 206 208 210 211 215 216 218 221 222 223 224 226 230 231 233 234 242 244 245 246 250

104. 1 3 5 6 10 11 12 13 14 15 16 17 19 20 21 30 31 32 36 37 38 39 41 42 43 44 45 46 47 51 52 55 56 57 58 59 60 61 62 63 65 68 69 71 72 74 77 79 83 85 88 92 94 95 98 99 103 105 106 107 108 109 113 115 116 120 122 123 125 126 127 129 130 133 135 138 140 141 142 143 144 145 146 147 148 150 151 155 157 159 167 169 175 176 177 178 183 184 187 188 189 191 193 197 198 199 200 202 203 206 207 208 209 211 213 214 215 217 218 219 221 222 223 228 233 234

235 236 242 243 244 245 246 247 249 250

105. 3 4 6 7 8 10 11 13 16 17 18 23 25 27 29 34 36 40 42 48 49 51 52 55 56 57 60 61 63 66 70 71 72 73 75 77 82 83 85 86 87 88 89 91 92 93 94 99 101 104 108 110 113 114 115 117 122 123 125 126 130 131 133 134 136 139 140 141 142 144 146 148 151 154 155 156 162 163 164 167 168 170 173 175 176 178 181 182 186 187 188 190 191 194 196 197 198 200 201 202 205 208 211 212 214 215 219 220 222 224 225 227 228 229 230 231 233 235 238 239 240 241 243 249 250

106. 2 3 4 5 9 12 13 16 18 21 22 23 24 26 27 28 29 31 34 35 38 39 40 41 43 44 46 47 48 51 53 55 56 57 60 63 64 68 69 72 75 76 78 80 82 84 86 87 88 91 92 94 96 98 100 101 103 104 108 110 111 112 114 115 122 123 125 127 128 130 131 133 134 138 142 148 149 152 153 154 156 159 160 163 167 168 170 171 172 173 176 178 181 182 184 185 187 196 197 199 201 202 204 207 208 209 212 214 216 219 222 225 226 227 228 232 234 236 238 239 242 244 248 249

107. 1 3 4 5 6 8 10 12 13 18 20 21 24 27 29 31 33 34 37 39 40 41 42 46 48 49 50 52 53 58 63 65 71 72 74 78 81 82 83 84 87 88 89 90 93 94 95 96 98 99 101 103 104 108 109 112 114 115 116 118 119 121 126 127 128 129 130 132 136 137 138 139 142 144 145 146 148 151 152 155 156 157 158 163 165 166 167 171 178 179 183 184 186 189 193 195 196 197 202 203 205 212 214 215 217 218 219 220 222 223 226 227 228 231 233 236 239 240 241 243 244 245 248 250

108. 5 7 8 11 12 14 17 19 22 23 25 26 27 28 29 33 36 37 41 43 45 48 49 51 52 58 59 61 62 68 70 71 72 75 78 79 84 85 86 89 91 92 95 99 100 101 103 104 105 106 107 109 114 119 123 124 125 131 134 135 137 138 139 141 142 144 146 147 152 157 159 160 163 164 165 167 172 173 174 178 180 181 185 189 190 191 192 194 196 200 201 202 203 204 206 209 211 213 214 215 219 224 227 229 230 233 237 239 240 241 244 246 250

109. 2 6 8 11 13 18 21 22 25 28 31 33 34 35 39 40 42 43 45 48 50 51 52 53 55 56 60 65 69 72 75 77 79 81 86 88 89 93 96 99 100 101 104 107 108 114 116 117 118 120 121 122 125 127 128 136 137 142 145 146 147 148 150 151 152 154 156 157 159 160 161 165 167 171 172 174 175 177 178 179 180 181 182 185 186 187 190 191 193 194 195 197 198 201 202 207 212 216 218 219 220 225 227 229 231 232 235 237 238 240 241 243 245 248 249 250

110. 1 3 4 5 6 7 8 11 15 17 18 19 21 27 28 30 31 33 34 36 37 38 41 46 48 51 52 53 54 56 58 60 62 64 65 67 69 70 71 72 73 74 76 77 81 82 83 86 88 89 91 92 93 95 96 97 99 101 102 105 106 111 112 113 115 116 120 123 124 126 127 128 130 131 132 134 139 140 141 144 145 149 152 154 155 156 157 159 160 164 167 168 169 171 175

176 178 179 180 184 185 186 187 189 191 192 196 197 201 202 203 204 205 206 207 209 211 212 220 225 226 228 231 232 233 234 236 237 239 243 244 246 247 249 250

111. 1 4 5 6 9 10 11 13 14 15 19 22 24 26 27 30 31 33 34 37 38 39 41 44 46 47 49 52 56 60 66 68 69 70 72 73 74 78 79 81 90 92 101 102 103 106 110 116 117 118 120 121 127 130 133 134 135 136 137 138 140 141 143 145 146 147 150 151 153 155 159 162 167 168 169 174 175 176 177 178 180 181 182 183 184 185 187 189 190 193 195 198 202 203 204 205 207 208 210 216 218 220 221 222 223 224 227 229 230 237 238 244 249 250

112. 1 2 3 5 6 10 11 12 14 17 18 19 21 24 25 29 32 33 35 36 37 38 39 41 43 44 48 50 52 54 57 58 59 60 61 63 64 70 71 72 73 75 77 78 79 80 82 87 88 89 91 92 97 98 102 106 107 110 113 115 116 120 122 123 129 130 131 133 149 153 154 156 158 159 160 161 163 164 167 171 173 174 177 179 181 182 184 186 187 188 190 194 195 196 197 198 204 206 209 211 214 215 218 219 220 222 223 226 227 228 230 231 240 241 244

113. 3 5 10 13 19 20 24 30 32 33 34 35 37 39 40 42 48 49 50 51 52 55 56 58 59 60 62 64 67 71 74 76 77 78 80 81 84 86 87 89 91 93 94 99 101 102 104 105 110 112 116 119 120 121 122 123 124 125 126 127 129 131 132 136 137 138 139 142 143 144 147 148 150 152 153 154 156 157 159 163 165 166 167 168 169 170 171 172 174 177 179 180 181 184 186 188 190 193 195 200 204 205 207 212 214 215 217 220 221 223 224 225 227 231 234 240 241 243 245 246 248 250

114. 2 3 4 5 7 9 10 11 12 13 14 15 18 19 20 21 22 23 24 26 28 32 35 36 39 40 42 44 46 47 50 51 53 54 56 58 59 63 64 66 68 69 70 73 74 76 77 80 81 82 84 85 86 89 90 95 97 98 99 100 102 103 105 106 107 108 109 115 116 118 119 121 123 128 133 134 139 141 143 144 145 149 151 153 154 155 156 158 160 162 163 164 165 166 170 171 172 173 175 179 180 181 182 184 187 188 190 192 193 194 196 198 201 202 203 205 207 209 210 211 212 214 215 216 218 220 221 223 224 225 226 227 228 229 232 234 236 241 243 245 249 250

115. 2 3 5 7 9 12 13 14 15 16 22 23 26 32 33 36 38 39 41 44 47 48 51 52 53 55 57 59 60 61 63 64 65 66 68 69 71 73 75 80 84 85 86 87 89 90 95 96 97 99 100 103 104 105 106 107 110 112 114 119 120 124 125 128 129 132 133 134 135 137 140 141 145 147 150 153 154 155 156 157 161 162 163 164 165 170 171 173 174 175 178 179 180 181 183 184 185 190 191 192 195 198 199 200 201 202 204 205 206 212 215 216 217 219 220 222 223 229 230 231 234 235 238 241 242 244 245 246 248 249 250

116. 2 5 8 9 11 12 13 14 19 20 21 27 33 34 35 36 38 39 40 44 47 49 50 51 54 56 58 59 62 63 66 67 68 69 70 71 75 77 78 79 81 82 93

96 97 98 100 101 103 104 107 109 110 111 112 113 114 117 121 123
124 125 130 131 132 134 135 137 139 140 141 142 146 148 151 152
155 156 157 158 159 160 163 164 166 169 171 172 173 175 176 178
181 185 187 188 189 191 194 199 200 203 209 210 211 212 213 216
218 219 220 222 223 224 225 226 228 229 231 232 234 240 241 247
248

117. 4 5 6 11 12 14 15 16 18 25 26 28 29 30 33 36 37 39 41 44
45 48 49 51 52 53 56 59 61 64 67 70 72 74 80 81 82 92 94 96 100
103 105 109 111 116 118 120 121 123 124 127 129 131 134 135 137
138 140 141 142 146 152 156 157 158 161 162 163 166 169 171 172
174 176 177 178 179 180 183 184 188 192 193 195 199 200 202 204
205 206 207 212 213 215 218 220 221 222 223 225 227 228 233 234
237 239 242 246 247 248 249 250

118. 2 4 5 7 8 9 10 12 14 15 17 20 21 23 24 25 26 29 33 34 35
36 38 41 45 48 53 56 59 60 61 63 67 68 70 74 77 78 79 80 81 82 83
86 87 90 95 97 100 101 102 103 107 109 111 114 117 122 124 125
135 136 139 141 142 143 145 148 150 153 154 157 158 163 165 167
168 170 173 174 176 177 178 179 181 182 183 187 189 191 192 195
196 199 200 206 209 210 214 215 218 220 222 223 225 226 227 228
230 231 232 239 240 242 244 246 249 250

119. 1 6 7 10 13 15 18 24 25 28 33 37 41 44 45 46 47 51 54 56
57 58 60 61 63 64 65 66 67 69 70 72 73 75 78 79 83 84 85 88 90
100 101 103 107 108 113 114 115 120 121 122 124 125 126 127 128
129 133 135 137 138 141 142 143 146 147 148 149 151 152 154 155
157 158 161 162 165 167 169 171 177 181 183 185 186 188 189 193
194 195 198 199 201 202 204 210 211 215 217 219 222 226 228 230
231 232 235 236 237 240 245 246 248

120. 7 8 10 11 13 14 17 21 22 24 25 27 28 29 33 34 39 41 45 46
47 50 51 52 53 54 56 59 62 66 67 70 73 76 80 82 84 85 87 89 92 95
98 99 102 103 104 109 110 111 112 113 115 117 119 121 122 124 125
127 128 129 130 132 134 136 141 144 145 146 147 148 152 153 154
155 157 158 159 160 163 166 169 172 173 174 177 178 180 182 183
191 194 195 197 198 199 200 202 203 204 206 207 208 211 212 215
218 219 220 221 222 227 228 229 232 233 236 237 239 240 242 243
244 246 247 248 250

121. 2 6 9 10 11 15 20 23 24 25 28 30 31 32 34 36 40 41 44 50
51 52 53 54 55 56 57 59 60 68 71 72 78 81 82 83 84 85 86 87 88 91
93 97 101 107 109 111 113 114 116 117 119 120 123 124 125 130 133
134 135 136 137 138 140 143 144 149 150 151 153 158 160 162 163
164 166 169 171 174 176 177 178 180 181 182 183 186 187 188 192
199 201 203 205 206 208 218 220 221 224 225 231 232 234 236 238
241 242 243 244 246 250

122. 1 6 7 8 11 17 19 26 28 29 30 31 32 34 36 40 45 46 47 49 51 53 59 60 61 62 64 65 66 68 70 76 80 82 83 86 89 93 95 97 99 101 102 103 104 105 106 109 112 113 118 119 120 125 126 127 128 131 133 135 136 138 143 144 146 148 149 152 153 154 157 158 159 160 164 165 167 169 170 172 173 176 177 179 183 184 185 187 188 191 193 194 195 197 203 204 210 211 212 213 215 216 218 219 220 221 222 223 224 227 228 229 230 235 236 237 238 240 241 242 243 245 246

123. 1 3 4 5 6 7 8 11 12 13 15 16 17 20 23 24 27 30 32 34 35 36 38 41 42 44 46 48 52 53 54 55 57 59 60 62 64 68 69 70 72 74 76 77 81 83 85 88 89 90 93 95 97 99 101 102 103 104 105 106 108 110 112 113 114 116 117 121 128 129 131 135 136 141 145 148 150 155 156 158 159 162 164 166 168 171 173 174 175 178 179 184 187 188 190 194 200 201 203 204 206 211 212 213 214 215 216 218 219 221 222 223 225 226 227 229 230 232 236 237 244 246 247 248 249 250

124. 1 2 3 4 5 6 13 18 20 21 22 24 25 29 30 31 34 36 38 39 40 43 46 48 49 52 53 55 60 61 62 64 66 67 69 70 74 75 81 82 85 86 88 89 91 92 93 95 97 98 103 108 110 113 115 116 117 118 119 120 121 125 128 129 132 133 139 140 141 142 144 147 149 150 152 154 156 157 159 161 164 165 166 169 170 174 175 179 180 181 182 183 185 186 187 189 194 200 206 209 211 212 213 214 215 216 217 218 220 222 223 227 228 229 230 232 233 236 237 238 240 245 247

125. 1 4 5 10 11 12 14 17 19 20 21 22 26 27 28 29 31 34 36 39 42 43 46 48 50 53 54 58 59 66 67 69 71 72 73 75 81 82 83 87 89 90 91 93 96 98 101 102 104 105 106 108 109 113 115 116 118 119 120 121 122 124 126 128 129 132 136 139 140 141 142 145 146 147 149 150 151 153 157 158 159 160 162 164 166 167 169 171 172 173 174 182 183 184 186 187 190 191 192 193 196 197 199 201 202 203 206 207 209 210 211 214 215 217 219 220 222 226 230 231 232 233 234 236 237 238 240 241 244 245

126. 1 2 3 5 7 9 10 11 15 16 19 24 26 29 30 35 36 38 41 43 44 45 48 51 54 58 62 65 68 69 70 71 72 75 77 80 81 82 85 87 88 98 99 100 103 104 105 107 110 113 119 122 125 127 129 131 133 134 137 138 139 141 143 144 145 148 150 152 157 158 159 163 165 170 172 175 180 187 189 190 191 192 197 198 199 200 203 205 207 209 211 213 214 216 217 218 219 220 221 224 227 228 229 230 231 232 237 239 240 242 243

127. 2 3 5 6 7 9 13 14 17 18 20 22 23 24 27 28 30 31 35 37 38 39 43 44 46 48 49 50 52 54 55 57 62 67 68 69 70 75 77 80 81 82 83 88 90 91 92 94 95 97 98 99 100 102 104 106 107 109 110 111 113 117 119 120 122 126 128 129 130 131 132 133 139 140 143 144 145 147 154 156 157 158 159 160 165 168 169 171 172 173 175 176 177

178 179 180 182 184 187 189 191 194 195 200 202 203 206 207 209 212 214 215 216 217 221 222 227 229 232 233 235 237 238 240 241 243 245 248 249 250

128. 2 3 4 6 7 16 19 22 24 27 28 29 31 33 34 35 37 38 39 40 42 44 45 46 51 52 53 55 56 63 65 67 69 70 72 73 74 75 76 78 79 82 84 85 87 88 89 90 91 93 94 96 97 98 99 102 103 106 107 109 110 114 115 119 120 122 123 124 125 127 129 132 134 136 137 139 142 146 148 151 152 153 154 155 158 159 163 164 165 169 170 174 175 176 178 181 186 189 190 192 193 197 198 200 204 205 206 207 209 213 216 219 223 226 230 232 234 238 239 240 243 245 246 248

129. 1 2 3 4 8 10 14 15 16 17 21 22 23 26 27 30 31 36 39 46 47 48 49 50 51 52 53 57 60 64 65 67 68 70 71 73 74 78 79 83 86 87 89 91 93 96 98 99 100 102 103 104 107 112 113 115 117 119 120 123 124 125 126 127 128 131 132 134 135 137 138 139 142 144 149 154 157 159 160 162 163 166 171 173 176 179 181 184 186 189 190 191 193 194 195 196 197 198 199 201 202 205 209 214 215 216 219 222 225 227 228 232 233 237 238 240 241 247 248 249 250

130. 2 4 5 8 10 12 19 20 22 23 27 28 31 34 36 37 39 41 44 45 46 48 54 55 57 58 59 61 63 64 65 66 67 71 72 73 74 75 76 78 79 80 83 85 90 92 94 96 99 100 101 102 103 104 105 106 107 110 111 112 116 120 121 127 132 134 135 138 142 143 145 146 150 157 158 159 165 167 168 170 171 172 174 175 179 180 182 183 184 185 186 187 190 191 193 198 201 202 203 204 205 206 207 208 210 218 222 226 229 230 231 232 235 238 239 240 242 246 247 249

131. 4 6 7 8 9 11 13 15 16 17 19 21 22 24 27 33 34 36 37 38 39 40 41 42 44 46 49 50 53 54 60 61 62 63 65 68 69 70 74 76 78 79 80 83 84 85 89 90 91 94 95 98 101 105 106 108 110 112 113 116 117 122 123 126 127 129 132 133 134 136 137 138 142 146 147 148 149 152 153 154 157 159 161 162 164 165 169 170 171 172 175 177 179 181 182 183 186 189 191 193 194 196 197 198 199 205 206 210 214 215 217 218 219 221 225 226 228 231 235 236 237 238 240 244 245 246 248 249

132. 3 6 10 15 17 18 19 24 32 33 34 35 36 37 39 40 42 44 45 48 51 53 54 55 62 66 67 68 70 71 72 73 74 75 76 83 84 85 86 88 89 90 91 92 94 95 97 98 100 102 107 110 113 115 116 120 124 125 127 128 129 130 131 134 141 144 149 150 152 153 154 156 157 158 161 162 165 167 168 169 173 174 179 181 183 184 189 191 192 193 196 197 198 199 200 205 209 211 212 214 215 218 219 222 223 225 226 230 231 232 233 240 241 243 244 249 250

133. 1 2 8 10 12 14 15 16 19 20 22 23 26 31 32 33 34 40 41 42 46 49 50 52 53 56 58 59 60 62 63 65 66 67 68 69 70 74 76 77 78 79 80 81 84 85 86 88 92 94 101 103 104 105 106 111 112 114 115 119

121 122 124 126 127 131 134 138 139 140 144 146 147 148 149 150 156 164 165 166 170 171 174 177 178 180 182 184 186 187 188 189 190 191 192 198 199 202 203 206 213 215 216 218 222 223 224 228 229 232 234 236 239 243 244 247 248 249 250

134. 3 4 6 12 13 14 15 16 18 20 21 23 25 26 27 29 32 36 38 39 40 42 45 47 49 50 54 55 57 59 60 61 62 65 67 72 75 81 82 83 84 85 86 87 88 89 90 91 94 95 96 98 101 102 103 105 106 108 110 111 114 115 116 117 120 121 126 128 129 130 131 132 133 137 138 139 140 142 144 145 146 148 152 153 154 155 159 160 161 162 166 170 173 174 176 177 178 180 181 187 188 190 191 192 197 200 201 204 209 210 213 217 218 219 220 221 222 224 230 232 233 237 240 241 242 247 250

135. 1 2 4 5 7 8 10 17 19 21 23 28 29 30 31 32 34 35 37 39 43 45 46 47 48 52 61 65 67 70 72 73 76 77 81 82 83 84 86 87 88 89 90 94 97 99 102 103 104 108 111 115 116 117 118 119 121 122 123 129 130 136 137 140 143 147 149 150 151 152 153 155 158 159 160 162 164 165 166 168 169 170 174 176 180 181 182 184 185 187 188 190 193 197 198 199 201 202 205 207 208 209 210 218 219 220 221 222 223 226 227 229 232 233 234 236 238 242 244 245 246 247 249 250

136. 2 4 5 7 8 9 11 12 13 14 17 18 28 29 31 32 33 34 40 42 48 49 50 51 54 57 64 68 70 72 74 75 76 78 79 81 83 84 85 91 92 93 94 95 96 98 100 101 105 107 109 111 113 118 120 121 122 123 125 128 131 135 139 140 144 147 148 149 157 163 168 171 172 173 178 179 182 185 186 190 192 194 200 202 205 206 207 208 209 210 211 212 213 214 215 216 217 218 225 227 228 229 231 233 238 239 241 242 243 246 247 248 250

137. 1 2 3 4 5 7 8 9 10 14 18 19 20 22 23 26 28 30 35 36 39 40 45 46 47 48 49 53 55 56 57 60 65 67 69 71 73 78 80 83 84 85 89 90 92 95 96 97 98 99 102 107 108 109 111 113 115 116 117 119 121 126 128 129 131 134 135 138 142 144 145 146 147 150 152 154 155 158 160 161 162 164 168 169 170 171 172 175 177 178 179 181 182 184 185 187 188 189 194 197 198 200 201 202 204 207 208 210 211 213 215 217 218 219 220 224 225 226 227 228 230 231 234 236 239 241 243 244 246 247 248 250

138. 2 5 6 8 10 13 18 19 21 27 28 31 33 35 37 38 39 40 41 42 45 47 52 53 55 56 60 61 62 63 65 67 68 70 72 74 76 77 84 85 88 89 90 91 96 98 104 106 107 108 111 113 117 119 121 122 126 129 130 131 133 134 137 140 143 146 148 149 151 152 153 155 157 158 159 160 162 163 164 165 168 169 173 174 176 177 178 179 181 182 184 185 186 187 188 189 195 197 202 204 206 215 216 218 219 220 221 223 226 227 229 231 232 238 240 241 244 245 246 248 250

139. 1 4 5 7 8 9 12 14 15 16 17 18 19 24 25 26 31 32 35 36 37

38 39 40 41 42 44 45 46 47 49 54 55 58 61 62 65 68 69 73 74 75 80 81 83 84 85 86 87 90 92 93 94 95 96 97 100 101 105 107 108 110 113 114 116 118 124 125 126 127 128 129 133 134 136 142 150 152 153 154 156 158 162 166 167 168 173 174 176 182 183 184 185 186 188 189 191 193 194 195 198 207 211 213 214 219 221 226 229 230 231 232 233 235 236 237 239 240 244 245 247 248

140. 1 4 5 7 8 12 14 15 18 19 22 23 25 26 27 29 31 32 36 37 39 42 43 44 46 47 50 51 53 54 55 56 57 58 60 61 63 64 66 67 68 69 70 76 78 80 82 83 84 85 86 87 88 90 97 98 101 104 105 110 111 115 116 117 121 124 125 127 133 134 135 136 138 142 145 149 151 152 155 159 160 161 162 165 168 169 170 171 172 174 176 179 180 182 183 188 191 194 195 196 202 203 207 208 209 210 211 214 216 219 221 222 223 224 228 229 231 233 234 236 237 241 244 245 246 248

141. 2 3 5 6 11 13 20 21 22 23 24 27 28 30 31 34 35 37 38 39 40 42 44 45 51 52 53 62 63 64 65 67 69 71 72 73 75 76 80 83 84 85 87 89 90 91 94 96 97 98 101 102 104 105 108 110 111 114 115 116 117 118 119 120 123 124 125 126 132 142 143 145 147 150 151 152 153 154 156 165 166 167 168 174 175 176 181 182 183 184 185 187 190 194 200 202 204 207 210 211 213 214 216 219 220 225 227 228 232 233 234 237 238 240 241 242 246 247 248

142. 2 3 4 5 6 7 11 13 16 19 22 23 24 26 27 29 30 31 32 35 36 38 39 40 44 45 46 47 48 49 50 51 54 55 59 60 64 65 68 70 72 73 75 77 79 86 90 91 92 94 99 102 104 105 106 107 108 109 113 116 117 118 119 124 125 128 129 130 131 134 137 139 140 141 146 151 155 157 161 166 167 168 169 171 173 175 176 181 183 186 187 190 192 194 195 198 199 201 202 203 205 206 208 211 212 216 219 220 221 223 224 225 226 227 228 229 233 234 235 236 239 241

143. 1 3 6 7 9 10 11 12 13 17 20 21 24 29 31 32 39 41 42 43 50 51 52 53 54 55 57 58 59 60 61 63 64 65 66 67 71 72 77 78 79 80 82 83 84 85 86 87 89 90 91 94 97 98 101 102 104 111 113 114 118 119 121 122 126 127 130 135 138 141 144 148 149 151 152 153 156 157 159 160 164 165 169 171 173 174 175 176 178 181 184 185 187 188 189 190 199 200 202 204 205 207 212 213 215 219 222 224 225 227 229 230 231 232 233 235 236 239 241 242 243 247 248 250

144. 3 12 13 14 17 18 19 20 21 22 23 25 26 27 28 29 31 32 34 37 38 40 43 44 45 47 48 49 50 54 56 60 61 62 63 64 65 66 67 68 72 73 74 75 80 81 83 85 87 88 89 90 93 94 95 96 97 101 104 105 107 108 110 113 114 120 121 122 124 126 127 129 132 133 134 136 137 143 150 151 152 153 154 156 157 158 161 163 164 165 166 167 171 172 181 182 183 185 187 189 193 195 196 197 203 204 210 213 214 219 221 223 226 230 232 236 239 242 245 246

145. 1 2 4 5 7 8 10 11 12 13 15 17 18 20 21 23 24 25 26 27 29

30 32 38 39 42 43 46 47 52 53 54 57 60 61 62 65 68 69 75 80 84 85 86 90 92 94 97 98 100 102 103 104 107 109 110 111 114 115 118 120 123 125 126 127 130 134 137 140 141 146 147 150 151 152 155 157 160 164 165 167 168 169 171 172 173 174 175 178 179 182 187 188 189 190 192 193 194 195 197 198 200 202 204 205 207 209 210 212 213 216 219 220 224 225 226 232 236 237 238 239 243 244 245 247 250

146. 3 4 7 8 9 11 12 19 20 21 22 24 30 31 33 35 37 39 40 42 44 47 48 50 53 55 56 58 60 62 68 70 71 72 73 74 75 76 79 80 82 83 85 89 90 95 99 100 102 104 105 107 108 109 111 116 117 119 120 122 125 128 130 131 133 134 137 138 142 145 150 151 154 157 160 161 162 163 167 169 170 176 178 179 181 182 183 188 189 194 196 200 201 202 205 208 209 210 211 212 214 215 217 219 221 223 225 226 227 230 231 232 233 236 239 244 249 250

147. 1 2 4 5 6 11 15 25 26 32 34 35 37 41 45 46 47 49 51 53 55 56 57 58 59 61 63 68 72 73 74 75 77 82 84 85 86 87 88 89 91 93 94 95 99 100 101 104 108 109 111 113 115 119 120 124 125 127 131 133 135 136 137 141 145 149 150 151 153 156 158 162 163 164 166 168 169 171 173 174 177 178 179 181 182 183 184 186 188 192 196 197 203 205 206 208 209 210 212 214 215 218 219 221 224 225 226 230 231 236 241 242 243 244 245 246 249 250

148. 2 5 6 10 13 14 15 18 19 20 21 23 26 37 39 40 41 43 46 48 51 52 53 54 55 57 59 60 64 66 68 69 73 74 76 77 80 81 82 84 85 86 89 92 93 95 97 98 103 104 105 106 107 109 113 116 118 119 120 122 123 126 128 131 133 134 136 138 143 153 154 161 171 172 173 174 175 179 180 181 184 185 186 187 188 189 190 191 195 197 198 200 202 203 205 206 210 211 212 213 217 218 224 226 227 229 230 231 235 237 238 240 241 242 247 249 250

149. 2 5 8 11 12 14 17 18 19 20 21 24 25 29 31 32 34 36 37 38 42 44 45 49 55 56 58 60 64 65 66 67 68 69 70 72 74 79 80 81 85 87 90 92 93 94 96 98 99 102 106 110 112 114 119 121 122 124 125 129 131 132 133 135 136 138 140 143 147 155 157 159 162 163 164 165 166 169 170 171 172 175 180 181 183 185 186 187 188 190 191 193 194 197 199 201 202 204 206 207 210 211 212 213 220 221 222 229 231 233 234 237 241 242 245 246 247 248

150. 6 7 9 12 15 16 17 20 23 25 29 32 33 35 37 41 46 47 48 50 51 52 54 55 58 59 60 62 64 65 66 68 69 72 74 75 80 83 87 88 90 93 94 95 96 97 98 99 100 101 104 109 111 113 115 118 121 123 124 125 126 130 132 133 135 137 139 141 144 145 146 147 153 154 157 161 163 164 165 171 172 173 174 175 176 177 178 181 182 183 184 185 186 192 193 195 196 200 203 204 207 208 210 211 212 217 218 220 221 222 223 224 227 228 229 230 232 233 236 238 240 242 246 247

151. 2 4 6 8 9 10 11 12 14 15 18 20 21 25 29 30 31 34 36 37 38 39 40 41 42 48 49 51 53 59 60 62 63 64 66 68 69 70 71 73 74 77 78 79 80 81 82 84 90 92 94 97 98 99 100 101 102 104 105 107 109 111 114 116 119 121 125 128 135 138 140 141 142 143 144 145 146 147 154 158 159 161 165 168 171 172 173 175 177 178 179 183 186 187 190 192 198 199 200 201 202 204 205 208 210 212 214 217 218 222 226 227 228 230 231 232 234 235 237 242 243 244 245 246 247 249 250

152. 1 2 3 4 7 8 9 10 12 15 17 18 19 20 22 23 25 27 29 30 31 32 34 36 38 41 42 44 45 50 56 59 61 62 63 64 67 68 69 72 74 75 76 79 80 81 90 91 92 93 96 101 102 106 107 108 109 110 113 116 117 119 120 122 124 126 128 131 132 134 135 137 138 139 140 141 143 144 145 155 158 160 161 164 168 171 172 173 175 178 179 187 190 191 193 194 199 201 204 206 208 211 212 217 222 226 230 232 234 236 237 238 241 242 244 245 247 250

153. 1 2 4 6 7 8 9 10 14 15 16 18 19 20 22 23 25 26 28 30 32 34 36 37 38 41 45 46 50 53 54 56 57 62 63 64 65 66 68 70 71 73 75 76 85 86 88 89 92 94 99 101 102 103 106 111 112 113 114 115 118 120 121 122 125 128 131 132 134 135 138 139 141 143 144 147 148 150 154 155 158 159 160 161 164 167 168 171 173 174 177 178 183 184 185 186 188 192 199 200 202 203 204 205 207 209 210 215 218 222 224 226 229 231 232 233 234 235 238 240 242 244 246 250

154. 4 7 8 10 14 15 16 20 21 24 25 27 31 34 37 39 40 41 42 46 47 49 52 53 54 57 59 60 61 64 65 66 68 69 71 72 73 74 75 78 79 81 83 85 87 88 89 93 95 96 98 101 105 106 109 110 112 113 114 115 118 119 120 122 124 127 128 129 131 132 134 137 139 141 144 146 148 150 151 153 155 156 157 158 160 161 162 164 165 166 167 172 173 174 175 176 178 179 180 183 185 186 187 188 191 192 197 199 200 201 202 203 207 210 211 212 213 215 217 218 221 222 224 227 228 229 230 231 232 234 235 237 240 241 242 243 245 247 248 250

155. 1 2 3 4 5 7 8 9 10 11 12 14 15 18 19 20 23 30 31 33 34 35 36 39 40 43 44 47 51 52 53 59 60 61 63 64 66 67 72 74 79 81 82 83 84 86 87 89 91 92 93 94 98 99 101 103 104 105 107 110 111 114 115 116 119 120 123 128 134 135 137 138 140 142 145 149 152 153 154 157 158 159 164 166 167 170 171 173 176 179 180 183 184 187 188 190 191 192 194 195 198 203 204 205 208 209 210 211 214 215 216 219 227 228 230 231 232 233 234 236 239 240 241 244 245 249

156. 1 2 3 4 5 6 10 13 14 15 16 18 20 21 23 24 26 29 35 36 37 38 42 43 44 46 49 51 52 57 60 62 65 68 69 70 72 74 76 77 78 79 82 85 90 91 94 95 96 99 102 105 106 107 109 110 112 113 114 115 116 117 123 124 127 132 133 139 141 143 144 147 154 157 158 159 161 162 164 167 169 170 173 177 181 183 184 185 186 187 188 189 191

193 194 200 202 203 206 207 215 216 217 219 220 221 222 223 225 226 229 230 231 233 234 246 249 250

157. 1 2 3 4 5 6 8 9 12 13 15 16 19 21 27 29 32 34 35 36 37 38 39 40 43 44 46 51 52 55 56 61 64 66 71 72 73 74 77 80 84 86 87 88 90 93 94 95 97 98 100 101 102 104 107 108 109 110 113 115 116 117 118 119 120 122 124 125 126 127 129 130 131 132 136 138 142 143 144 145 146 149 150 154 155 156 160 163 165 166 168 170 171 172 173 175 176 177 178 181 182 184 185 186 188 194 196 199 200 202 203 207 212 214 215 216 219 220 222 224 228 229 234 236 237 238 241 242 243 244 247 249

158. 3 4 5 6 7 14 16 17 18 21 23 24 29 31 32 34 38 40 41 42 46 48 50 51 53 54 55 56 58 59 61 62 64 65 66 68 70 72 73 79 80 82 83 85 87 88 91 94 97 98 99 100 101 102 103 107 112 114 116 117 118 119 120 121 122 123 125 126 127 128 130 132 135 137 138 139 144 147 151 152 153 154 155 156 160 161 162 165 166 167 169 171 173 174 175 176 178 182 185 186 187 190 192 193 194 195 197 198 200 201 202 204 205 206 207 208 210 211 212 215 216 219 220 225 226 227 228 230 232 234 236 238 239 240 241 244 248 249

159. 1 2 6 7 9 10 11 12 13 14 15 18 19 21 23 25 26 28 29 32 39 42 48 53 54 55 56 57 58 61 65 66 67 68 69 70 72 73 77 78 79 83 85 89 92 94 95 96 97 98 99 103 104 106 108 109 110 111 112 113 116 120 122 123 124 125 126 127 128 129 130 131 134 135 138 140 143 149 151 153 155 156 161 164 166 167 168 169 170 172 173 174 176 178 179 183 185 188 191 193 195 197 198 199 201 204 208 209 215 216 220 223 224 227 228 229 231 232 233 234 235 236 242 243 245 248 249

160. 1 2 3 6 8 9 10 11 12 13 14 16 18 19 20 21 22 23 24 25 30 31 32 33 35 40 41 42 43 45 46 52 54 57 58 62 73 74 76 77 78 79 80 81 88 90 95 101 102 103 106 108 109 110 112 114 116 120 121 122 125 127 129 134 135 137 138 140 143 145 146 152 153 154 157 158 162 166 169 170 174 177 179 184 185 187 189 190 191 194 196 198 200 203 204 206 208 209 213 214 216 219 220 221 223 225 231 234 236 237 243 245 246 248

161. 1 5 7 10 11 14 19 23 26 27 28 31 35 37 38 39 40 43 44 45 46 48 50 51 52 54 55 59 61 62 63 64 67 68 69 75 77 78 81 84 87 89 91 92 95 99 100 102 103 109 112 115 117 119 124 131 132 134 137 140 142 144 146 148 150 151 152 153 154 156 158 159 162 163 164 165 166 167 169 170 172 174 177 178 182 183 187 188 189 191 192 194 196 197 200 201 203 204 206 207 210 212 213 216 217 218 222 226 227 228 231 234 239 241 243 246 248

162. 1 4 6 9 10 11 12 14 15 16 17 18 19 20 22 25 29 30 31 34 37 39 40 41 42 43 44 45 48 49 52 53 55 56 60 63 64 67 69 70 71 72 73

74 76 77 82 84 88 89 91 92 95 97 105 111 114 115 117 119 121 123 125 129 131 132 134 135 137 138 139 140 146 147 149 154 156 158 160 161 164 165 170 172 173 174 175 177 179 180 183 185 189 191 192 194 198 200 202 203 204 205 209 212 216 217 218 222 225 228 230 231 236 237 240 241 242 245 249 250

163. 3 4 5 7 8 15 16 17 18 20 22 23 24 25 27 30 31 34 35 37 38 39 40 41 42 43 46 48 55 58 62 67 72 74 75 76 83 89 90 92 96 99 100 101 102 103 105 106 107 108 112 113 114 115 116 117 118 120 121 126 128 129 136 138 144 146 147 149 150 157 161 165 166 168 169 172 173 174 175 176 178 179 180 181 183 184 186 188 189 191 193 196 197 201 203 207 208 209 211 212 214 216 217 218 220 222 223 224 227 229 230 232 235 239 242 243 246 247 249

164. 1 2 3 4 6 11 12 14 18 22 24 25 26 27 28 33 35 36 38 40 41 42 43 45 46 48 49 50 51 52 53 54 56 57 59 64 67 69 70 71 73 75 77 79 82 84 85 91 93 94 95 96 98 99 101 103 105 108 110 112 114 115 116 121 122 123 124 125 128 131 133 135 137 138 143 144 145 147 149 150 152 153 154 155 156 159 161 162 166 167 168 170 171 172 173 174 176 177 178 181 182 183 184 186 187 190 191 193 195 197 198 199 200 202 204 207 208 209 210 212 213 214 215 216 217 218 221 223 224 226 227 228 230 231 232 234 235 236 237 238 239 242 243 246 247 248 250

165. 3 5 6 7 8 11 13 14 16 19 20 21 22 23 24 26 27 29 30 31 32 33 34 39 40 41 43 44 45 46 53 55 59 61 62 63 65 66 68 71 72 74 76 77 79 81 82 87 88 90 92 98 102 103 107 108 109 113 114 115 118 119 122 124 126 127 128 130 131 132 133 135 138 140 141 143 144 145 149 150 151 154 157 158 161 162 163 166 167 173 174 175 176 177 178 180 181 182 183 186 188 192 193 196 200 202 209 210 211 212 214 215 217 218 221 224 225 231 234 244 245

166. 1 8 12 13 15 16 18 20 24 26 28 32 34 40 41 44 45 46 49 50 52 54 55 56 57 59 63 64 65 66 71 77 79 80 82 84 88 89 93 94 95 96 99 103 107 113 114 116 117 120 121 123 124 125 129 133 134 135 139 141 142 144 147 149 154 155 157 158 159 160 161 163 164 165 169 170 173 175 178 181 182 183 184 185 186 188 189 190 191 196 197 198 200 202 205 206 207 209 211 212 214 215 216 221 224 226 227 230 231 233 234 235 236 237 238 240 241 242 246 248 250

167. 4 6 7 9 12 13 14 17 21 23 25 27 28 31 32 35 36 37 38 39 40 41 42 43 47 49 51 53 54 56 57 60 62 66 67 68 71 73 82 83 86 87 88 90 91 93 94 95 96 98 100 102 103 104 105 106 107 108 109 110 111 112 113 118 119 122 125 130 132 139 141 142 144 145 146 153 154 155 156 158 159 161 164 165 169 170 172 173 174 176 178 183 184 186 188 189 190 191 193 196 198 201 202 203 204 205 207 209 210 212 213 216 219 222 226 227 228 230 231 232 236 237 240 241 243

244 246 248 249

168. 3 4 5 6 7 8 9 10 11 15 17 18 19 20 25 26 27 28 30 31 35 41 46 52 53 58 62 63 64 67 68 72 74 76 77 78 83 85 86 88 90 91 93 95 96 97 98 105 106 110 111 113 118 123 127 130 132 135 136 137 138 139 140 141 142 145 147 151 152 153 157 159 163 164 172 173 176 178 180 181 183 186 189 193 194 195 198 199 200 201 202 203 206 209 212 213 217 218 219 220 221 223 224 225 226 227 228 230 231 233 234 236 238 239 240 242 243 246 247 248 249

169. 3 5 6 8 9 10 11 12 13 14 15 16 19 22 25 26 28 29 30 31 32 33 34 37 38 39 41 46 50 51 52 56 57 58 59 60 65 66 67 68 69 71 74 76 77 78 79 81 83 84 89 90 92 93 94 96 97 99 103 104 110 111 113 116 117 119 120 121 122 124 125 127 128 131 132 135 137 138 140 142 143 145 146 147 149 156 158 159 160 161 163 166 167 171 173 175 177 178 179 186 187 189 190 193 194 198 200 201 202 203 204 205 206 207 208 210 211 213 214 217 222 223 224 225 226 227 228 229 230 234 236 237 238 239 240 241 242 243 247 248 249 250

170. 2 7 8 9 10 13 14 15 17 18 19 20 21 22 24 25 26 28 29 31 34 35 41 42 45 46 47 48 49 50 52 53 54 60 61 62 65 66 67 69 73 74 75 76 77 81 84 85 87 88 89 94 96 98 99 105 106 113 114 115 118 122 124 126 128 130 131 133 134 135 137 140 146 149 155 156 157 159 160 161 162 164 166 167 171 172 176 179 180 181 182 186 188 190 191 192 195 196 202 203 206 210 211 213 215 218 219 221 222 223 228 230 231 232 236 237 238 243 245 247 248 249 250

171. 1 7 9 11 15 17 18 20 21 24 25 26 29 30 33 35 38 39 40 43 45 46 51 56 57 59 60 62 65 66 70 74 76 80 81 85 87 88 89 90 92 95 96 99 101 102 103 106 107 109 110 112 113 114 115 116 117 119 121 123 125 127 129 130 131 133 136 137 140 142 143 144 145 147 148 149 150 151 152 153 155 157 158 164 169 170 172 175 176 177 180 181 182 184 185 187 188 191 194 195 198 199 200 202 207 209 210 211 212 213 214 215 216 219 221 223 228 230 231 234 237 242 244 246 247 248 249

172. 1 3 4 5 9 11 12 17 18 19 21 22 23 25 29 30 35 36 37 40 41 42 47 49 50 52 53 54 55 56 57 59 70 72 74 75 76 78 81 82 83 84 86 90 91 93 97 98 99 100 101 106 108 109 113 114 116 117 120 122 125 126 127 130 131 136 137 140 144 145 148 149 150 151 152 154 157 159 161 162 163 164 167 168 170 171 173 174 176 178 180 181 182 183 184 187 188 190 193 194 196 198 199 200 203 205 206 208 217 218 222 223 224 225 227 228 230 233 234 235 236 245 249

173. 2 3 4 6 7 8 10 12 13 17 18 25 26 28 29 30 36 37 39 40 42 43 45 48 49 51 53 58 60 62 64 65 67 68 69 70 73 77 80 81 87 88 89 90 91 92 94 96 97 98 99 100 101 102 105 106 108 112 114 115 116 118 120 122 123 125 127 129 132 134 136 138 139 142 143 145 147

148 150 151 152 153 154 155 156 157 158 159 162 163 164 165 166 167 168 169 172 175 176 177 178 179 181 184 186 187 190 193 194 195 197 199 200 202 203 204 205 206 207 208 210 211 212 213 215 216 219 220 225 228 229 231 232 233 235 238 242 243 247 250

174. 1 2 4 5 7 8 11 12 14 15 16 17 19 21 22 23 24 27 28 29 30 32 33 34 37 39 40 41 42 43 44 46 47 49 55 57 58 59 60 62 63 65 67 68 69 70 71 72 73 74 77 78 80 82 83 84 86 87 89 91 92 93 94 97 101 102 108 109 111 112 113 115 117 118 120 121 123 124 125 128 130 132 133 134 135 138 139 140 141 143 145 147 148 150 153 154 158 159 160 161 162 163 164 165 167 172 177 178 184 185 187 189 192 193 194 196 197 198 200 201 204 206 208 210 212 214 217 220 221 225 229 232 233 236 237 241 243 244 245 247 249

175. 3 4 6 9 11 12 15 17 22 23 24 25 26 28 29 32 33 34 36 38 40 43 47 48 49 51 52 56 58 63 66 71 75 78 81 82 83 84 86 87 88 89 90 93 95 97 98 99 100 101 103 104 105 109 110 111 114 115 116 123 124 126 127 128 130 131 137 141 142 143 145 148 149 150 151 152 154 157 158 162 163 165 166 169 171 173 176 177 178 179 182 183 186 189 192 193 194 195 196 197 198 202 203 205 209 214 216 217 219 220 221 223 224 226 227 228 230 234 236 242 243 245 249

176. 1 3 5 8 9 11 12 14 15 16 17 18 19 20 21 22 23 26 27 29 30 34 36 37 38 39 40 42 46 48 49 52 53 54 55 58 59 60 61 65 66 67 68 72 73 74 75 77 78 81 82 84 86 90 91 95 96 97 102 104 105 106 110 111 116 117 118 121 122 127 128 129 134 135 138 139 140 141 142 143 146 150 154 155 157 158 159 163 164 165 167 168 170 171 172 173 175 177 179 182 183 184 185 186 191 192 193 194 198 199 201 202 203 204 205 207 208 209 210 211 214 215 216 224 225 227 229 230 233 236 240 242 245 248 250

177. 1 2 5 6 7 8 14 15 20 22 23 25 30 31 32 33 35 38 40 41 43 46 47 50 53 55 56 59 60 62 63 64 65 66 67 68 69 71 73 75 78 80 82 84 85 86 87 89 90 91 94 97 98 99 100 101 103 104 109 111 112 113 117 118 119 120 121 122 127 131 133 134 137 138 147 150 151 153 156 157 160 161 162 164 165 169 171 173 174 175 176 179 184 185 187 190 192 193 194 195 196 197 198 201 202 204 205 206 207 209 212 214 216 219 220 222 224 226 227 229 230 232 233 238 239 240 241 242 243

178. 1 4 5 6 7 8 9 12 14 15 16 17 18 19 20 21 22 23 25 27 32 33 37 39 40 45 48 49 50 53 54 55 56 57 58 61 62 63 65 69 70 71 73 74 75 76 78 79 80 82 83 85 90 92 93 95 96 97 98 100 101 104 105 106 107 108 109 110 111 115 116 117 118 120 121 123 127 128 133 134 136 137 138 143 145 146 147 150 151 152 153 154 157 158 159 161 163 164 165 166 167 168 169 172 173 174 175 179 180 184 187 188 189 191 192 195 196 198 199 202 205 207 208 209 210 213 215 217

218 223 224 232 236 237 238 240 241 242 244 246 247 248

179. 3 7 10 13 15 16 17 19 20 21 24 25 28 30 33 34 36 37 38 39 40 48 51 52 53 55 58 61 64 66 67 69 70 75 77 78 79 81 84 85 87 88 95 96 97 99 100 102 107 109 110 112 113 114 115 117 118 122 123 124 127 129 130 131 132 136 137 138 140 145 146 147 148 151 152 154 155 159 160 162 163 169 170 173 175 176 177 178 182 187 188 191 194 195 196 197 200 202 207 208 210 211 214 215 217 218 223 224 225 226 227 228 232 233 234 236 237 238 239 240 243 244 245 246 250

180. 2 4 9 11 12 13 14 15 16 17 18 20 21 22 26 27 30 31 33 34 36 40 41 42 43 44 49 50 52 53 54 56 61 64 66 67 71 72 73 77 78 79 80 84 86 87 88 89 91 92 94 96 97 108 109 110 111 113 114 115 117 120 121 124 126 127 130 133 134 135 140 148 149 154 155 162 163 165 168 170 171 172 178 185 191 193 194 198 204 205 206 207 210 211 219 220 221 226 228 229 232 233 234 235 238 239 240 242 244 245 247 248

181. 1 5 6 14 15 18 20 21 25 30 34 37 39 40 42 43 44 45 49 50 51 52 56 58 61 62 63 64 68 69 70 72 77 78 81 88 89 90 91 92 94 96 97 98 101 102 105 106 108 109 111 112 113 114 115 116 118 119 121 124 128 129 131 132 134 135 137 138 141 142 143 144 146 147 148 149 150 156 157 163 164 165 166 168 170 171 172 173 182 183 184 185 186 189 190 192 198 200 201 202 204 208 211 212 214 215 218 223 224 226 230 233 235 236 240 243 244 248

182. 2 4 5 7 8 9 11 13 14 15 16 19 21 22 28 29 30 31 32 34 35 36 37 40 42 43 46 47 49 54 55 56 57 60 61 62 65 66 71 72 73 74 77 78 79 82 84 86 88 90 91 93 94 96 97 99 101 105 106 109 111 112 114 118 120 121 124 125 127 130 131 133 135 136 137 138 139 140 141 144 145 146 147 150 157 158 161 164 165 166 170 171 172 175 176 179 181 183 189 191 192 193 194 197 198 199 201 206 208 209 214 216 218 219 221 224 227 231 232 233 234 236 239 240 243 248 250

183. 1 4 5 7 8 9 10 14 15 16 17 18 20 21 24 25 26 28 32 33 34 35 38 40 42 43 44 46 47 48 49 51 52 53 54 55 57 58 59 62 63 65 69 70 74 75 76 77 79 80 83 84 85 87 88 89 91 92 98 100 102 103 104 107 111 115 117 118 119 120 121 122 124 125 130 131 132 139 140 141 142 144 146 147 149 150 151 153 154 155 156 159 161 162 163 164 165 166 167 168 172 175 176 181 182 184 185 186 187 189 190 191 192 194 195 196 197 202 206 209 210 214 215 219 222 224 225 230 234 236 238 239 240 242 243 245 247 250

184. 3 5 8 12 15 17 21 22 23 24 25 26 30 31 34 35 38 44 45 47 49 51 52 54 56 57 63 65 68 69 71 73 75 77 78 79 84 85 86 87 88 89 91 92 93 96 97 100 102 103 104 106 107 110 111 112 113 114 115

117 122 123 125 127 129 130 132 133 135 137 138 139 141 143 147 148 150 153 155 156 157 160 163 164 166 167 171 172 173 174 176 177 178 181 183 189 190 191 197 200 202 203 205 206 207 208 211 212 213 214 215 217 220 222 223 227 228 231 233 234 238 239 241 242 245 247

185. 3 6 8 10 11 12 15 19 21 22 23 24 25 28 29 30 32 34 35 36 40 41 42 43 44 45 47 48 50 51 53 54 55 56 58 60 62 64 67 71 74 75 77 78 80 82 83 84 85 86 88 93 94 95 98 100 103 106 108 109 110 111 115 116 119 122 124 130 135 136 137 138 139 141 143 144 148 149 150 153 154 156 157 158 159 160 162 166 171 174 176 177 180 181 183 190 192 199 200 201 202 203 204 206 209 210 212 215 216 217 218 227 228 230 232 233 234 236 238 240 242 243 249

186. 1 2 5 7 8 10 11 12 13 14 16 17 21 22 23 24 30 33 35 37 38 40 41 43 47 49 50 55 56 62 63 65 66 67 71 72 73 77 78 79 80 85 86 89 92 98 100 102 105 107 109 110 112 113 119 121 124 125 128 129 130 131 133 136 138 139 142 147 148 149 150 151 153 154 156 157 158 163 164 165 166 167 168 169 170 173 175 176 181 183 189 191 194 197 198 199 201 204 205 206 208 210 213 215 216 217 221 223 224 225 226 229 232 233 236 240 242 243 245 247

187. 1 2 3 11 12 13 14 17 18 19 26 29 33 34 36 37 39 44 47 48 49 54 55 56 57 63 64 66 68 69 70 71 72 79 80 81 82 83 89 90 92 93 94 95 96 99 100 103 104 105 106 109 110 111 112 114 116 118 121 122 123 124 125 126 127 130 133 134 135 137 138 141 142 143 144 145 148 149 151 152 154 155 156 158 160 161 164 169 171 172 173 174 177 178 179 183 188 191 192 193 195 196 197 198 199 200 201 204 212 216 219 220 223 225 227 228 229 230 231 232 233 234 235 236 237 238 242 243 244 245 248 249 250

188. 1 3 5 6 7 10 11 13 14 15 16 17 18 19 21 22 23 24 26 27 28 30 36 38 40 41 43 44 45 50 54 55 56 57 58 60 62 63 65 67 68 74 76 77 79 80 84 85 86 88 89 91 92 94 95 99 100 104 105 112 113 114 116 117 119 121 122 123 133 134 135 137 138 139 140 143 145 146 147 148 149 153 154 155 156 157 159 161 163 165 166 167 170 171 172 178 179 187 189 190 191 193 194 195 196 197 198 199 200 203 205 206 207 208 209 210 211 212 214 217 218 219 220 223 224 226 227 228 232 233 236 237 240 243 245 247 249

189. 3 5 6 7 8 12 13 14 18 19 21 23 24 26 27 28 30 34 37 39 42 43 44 47 48 50 51 56 59 60 62 63 64 65 66 68 70 73 74 77 78 88 89 91 94 95 97 100 101 102 104 107 108 110 111 116 118 119 124 126 127 128 129 131 132 133 137 138 139 143 144 145 146 148 156 160 161 162 163 166 167 168 169 174 175 178 181 182 183 184 186 188 190 191 194 199 200 202 204 213 216 217 219 220 222 223 224 227 229 231 233 234 240 249 250

190. 4 5 7 8 10 11 12 15 16 17 20 22 23 24 25 26 28 31 32 34 36 37 41 44 45 46 47 49 51 53 58 60 61 63 65 67 69 73 76 78 81 83 86 87 90 91 96 97 98 100 103 105 108 109 111 112 113 114 115 123 125 126 128 129 130 133 134 135 136 141 142 143 145 148 149 151 152 155 158 160 164 166 167 169 170 172 173 177 181 183 184 185 188 189 193 194 196 197 198 202 204 208 211 213 214 216 217 218 219 221 222 223 230 231 233 234 235 238 240 241 244 245 246 249

191. 7 8 13 14 16 17 19 21 22 23 24 25 28 29 31 32 33 35 38 39 40 41 42 43 48 50 51 52 53 59 60 61 64 65 67 69 70 71 72 73 74 75 78 82 83 84 86 87 88 89 90 91 93 95 97 98 99 104 105 108 109 110 115 116 118 120 122 125 126 127 129 130 131 132 133 134 139 140 148 149 152 154 155 156 159 160 161 162 163 164 166 167 170 171 176 178 179 180 182 183 184 186 187 188 189 192 193 195 196 197 200 201 202 204 208 209 210 214 216 218 223 230 231 232 233 234 235 236 237 238 239 243 244 246 248 250

192. 1 2 5 8 13 15 19 21 23 25 26 28 34 35 40 41 42 43 44 45 46 47 50 52 54 56 58 59 62 63 64 69 70 73 75 77 78 80 82 86 87 88 90 91 92 93 94 97 98 101 102 103 108 110 114 115 117 118 121 125 126 128 132 133 134 136 142 145 147 150 151 153 154 155 158 161 162 165 170 174 175 176 177 178 181 182 183 185 187 191 194 195 198 200 202 203 207 208 210 212 215 217 219 220 221 222 226 227 228 229 230 234 235 236 237 240 241 242 243 246 247 250

193. 1 2 5 7 8 10 11 14 17 19 22 24 26 27 28 29 31 34 35 37 40 41 43 46 47 49 50 51 55 57 59 61 62 65 67 68 70 71 73 77 78 79 85 86 87 88 89 92 98 101 102 103 104 107 109 111 113 114 117 119 122 125 128 129 130 131 132 135 139 144 145 149 150 152 156 158 159 163 164 165 167 168 169 172 173 174 175 176 177 180 182 187 188 190 191 195 196 198 199 201 202 204 207 210 211 220 222 223 224 225 231 232 233 234 237 239 240 241 242 244 248 250

194. 1 3 4 7 12 13 14 18 21 25 26 27 29 30 32 33 37 38 39 42 44 46 48 49 51 52 53 54 55 58 61 65 67 69 72 73 74 75 78 80 84 86 87 89 92 93 94 95 96 98 99 102 103 105 108 109 112 114 116 119 120 122 123 124 127 129 131 136 137 139 140 141 142 145 146 149 152 155 156 157 158 160 161 162 168 169 171 172 173 174 175 176 177 179 180 182 183 186 188 189 190 192 195 196 197 198 202 203 205 207 212 213 215 216 217 218 220 223 228 229 235 239 240 241 243 244 245 248 249

195. 1 2 3 5 7 8 9 12 14 18 19 23 25 26 27 28 29 30 31 33 37 38 39 42 43 45 46 49 51 52 53 55 56 57 58 59 61 62 63 64 65 66 67 68 71 72 73 75 77 78 79 81 82 83 84 85 86 88 89 91 92 93 95 96 99 107 109 111 112 113 115 117 118 119 120 122 127 129 138 139 140 142 144 145 148 150 155 158 159 164 168 170 171 173 175 177 178

179 183 187 188 191 192 193 194 198 201 205 207 209 212 213 216 218 222 223 224 225 227 228 232 233 234 235 240 243 244 245 246 248 250

196. 1 2 3 7 8 9 11 13 14 15 16 17 19 21 22 23 25 27 31 32 36 37 38 39 40 43 46 48 49 50 52 55 56 57 59 62 63 64 66 70 71 72 73 74 84 85 86 88 90 91 94 95 96 98 99 100 101 105 106 107 108 110 112 114 118 125 129 131 132 140 144 146 147 150 157 160 161 163 165 166 167 170 172 174 175 177 178 179 183 187 188 190 191 193 194 201 206 207 210 212 214 217 220 223 225 226 227 228 230 231 232 236 237 239 240 241 242 247 248 250

197. 1 2 3 4 5 8 11 12 14 15 17 18 22 27 31 32 36 40 41 42 45 46 48 51 52 55 58 59 60 62 63 71 72 74 76 78 80 85 86 88 92 93 95 96 99 101 102 103 104 105 106 107 109 110 112 120 122 125 126 128 129 131 132 134 135 137 138 144 145 147 148 149 154 158 159 161 163 164 166 173 174 175 177 179 182 183 184 186 187 188 190 191 194 199 201 202 206 209 212 215 216 222 225 227 228 229 231 235 239 241 244 249

198. 3 5 8 9 12 13 15 17 18 19 20 21 22 23 24 25 26 27 28 33 34 38 39 43 45 46 47 54 57 59 67 69 76 79 80 81 83 84 86 88 89 90 93 94 96 97 98 100 101 103 104 105 109 111 112 114 115 119 120 126 128 129 130 131 132 133 135 137 139 142 145 148 151 155 158 159 160 162 164 166 167 168 169 171 172 174 175 176 177 178 180 181 182 186 187 188 190 192 193 194 195 203 208 209 210 211 213 215 217 222 229 235 240 242 243 244 246 247 248 249

199. 2 6 7 8 10 15 16 17 18 19 24 26 27 28 34 35 42 47 49 52 54 57 59 61 62 63 64 65 70 71 77 78 79 81 86 87 88 89 91 92 95 96 98 99 100 101 103 104 106 115 116 117 118 119 120 121 125 126 129 131 132 133 135 142 143 149 151 152 153 154 157 159 164 168 171 172 173 176 178 182 185 186 187 188 189 193 197 203 204 205 207 209 211 215 216 218 221 222 223 224 225 227 230 231 234 237 238 247

200. 3 4 8 13 15 16 17 18 19 24 27 29 30 31 33 34 35 36 38 40 43 44 50 51 53 58 60 64 65 67 69 70 71 72 76 78 79 80 81 84 85 87 88 89 90 92 93 95 98 104 105 108 113 115 116 117 118 120 123 124 126 127 128 132 134 136 137 141 143 145 146 148 150 151 153 154 156 157 158 160 161 162 164 165 166 168 169 171 172 173 174 179 181 184 185 187 188 189 191 192 202 203 204 207 208 211 213 214 216 221 222 224 226 228 232 234 238 239 240 242 244 246 247 249

201. 1 3 4 8 10 11 12 15 19 21 22 23 30 31 34 35 37 38 40 41 43 50 51 54 57 62 65 66 68 69 70 71 72 73 74 76 78 79 80 82 87 96 98 99 101 105 106 108 109 110 114 115 119 121 123 125 129 130 134 135 137 142 146 149 151 152 154 158 159 161 163 167 168 169 174

176 177 181 182 185 186 187 191 193 195 196 197 206 207 208 209 216 217 221 222 223 224 225 226 228 231 234 235 239 243 244 247 248 249

202. 1 3 6 9 14 15 16 18 19 23 24 26 27 28 29 34 38 39 43 44 45 46 48 50 51 53 55 58 60 62 69 72 75 80 83 85 88 89 90 91 92 93 96 99 100 101 103 104 105 106 107 108 109 110 111 114 115 117 119 120 125 127 129 130 133 135 136 137 138 140 141 142 143 145 146 148 149 151 153 154 156 157 158 162 164 165 166 167 168 169 170 171 173 175 176 177 178 179 181 183 184 185 189 190 191 192 193 194 197 200 203 204 206 207 212 214 217 219 223 225 228 230 235 236 237 238 239 241 245 250

203. 1 2 3 4 7 11 12 14 15 17 21 23 24 27 28 30 31 32 33 35 39 40 42 47 49 50 53 55 59 61 64 68 71 73 74 75 77 79 83 84 85 89 90 92 103 104 107 108 110 111 114 116 120 121 122 123 125 126 127 130 133 140 142 144 147 148 150 153 154 155 156 157 160 161 162 163 167 168 169 170 172 173 175 176 184 185 188 192 194 198 199 200 202 204 205 206 207 208 211 213 214 215 220 221 224 226 227 228 230 231 232 234 236 241 242 244 247 250

204. 3 4 6 7 12 19 21 27 29 30 31 32 33 34 36 37 39 40 41 42 47 48 49 50 53 57 58 59 60 61 64 68 75 78 79 80 83 84 85 86 89 93 94 97 98 99 106 108 110 111 112 113 115 117 119 120 122 123 128 130 134 137 138 141 143 144 145 149 150 151 152 153 155 158 159 160 161 162 164 167 169 173 174 176 177 180 181 185 186 187 189 190 191 193 199 200 202 203 209 210 211 213 214 217 219 221 222 223 225 226 227 229 232 233 234 236 237 239 240 242 245 246 247 250

205. 1 5 6 7 8 9 12 13 14 16 17 19 20 21 22 23 25 27 28 29 30 31 33 34 36 37 40 42 43 44 45 47 48 49 50 51 53 57 59 60 65 66 69 74 76 81 83 84 85 86 87 88 89 93 96 98 105 107 110 111 113 114 115 117 121 126 128 129 130 131 132 135 136 142 143 145 146 147 148 151 153 155 158 162 166 167 169 172 173 175 176 177 178 180 184 186 188 194 195 199 203 207 209 210 211 214 215 222 223 225 227 228 229 230 233 235 236 239 241 242 243 245 248 250

206. 1 4 5 6 9 10 11 12 13 14 16 21 22 23 24 25 28 32 33 34 35 36 41 44 45 46 47 48 49 50 54 65 67 69 71 72 73 75 76 77 78 79 81 83 85 86 87 90 96 97 98 99 101 102 103 104 108 110 112 115 117 118 120 121 123 124 125 127 128 130 131 133 136 138 142 147 148 149 152 156 158 160 161 166 168 169 170 172 173 174 177 180 182 183 184 185 186 188 196 197 201 202 203 207 209 212 213 216 219 221 222 224 229 230 231 235 238 239 240 241 243 244 245 246 247 248 249 250

207. 4 5 7 8 9 12 17 18 20 21 22 30 31 32 33 34 35 37 38 40 41 43 44 46 47 48 49 51 52 53 57 59 60 61 64 67 70 73 76 79 81 82 83

85 87 89 93 97 99 101 102 104 106 109 110 111 113 114 117 120 125 126 127 128 130 135 136 137 139 140 141 143 145 149 150 153 154 156 157 158 161 163 164 166 167 169 171 173 176 177 178 179 180 184 188 192 193 194 195 196 199 200 201 202 203 205 206 208 209 214 216 219 220 221 222 225 226 235 238 240 242 243 244 246 249

208. 1 5 6 7 8 12 15 16 19 22 25 26 31 32 35 37 38 39 40 41 42 46 47 49 50 53 54 58 59 63 66 67 68 69 71 72 73 76 77 78 79 80 82 83 85 88 90 91 95 96 99 101 102 103 104 105 106 111 120 121 130 135 136 137 140 142 146 147 150 151 152 155 158 159 160 163 164 169 172 173 174 176 178 179 181 182 184 186 188 190 191 192 198 200 201 203 207 209 213 215 218 220 221 222 223 224 225 226 227 229 230 231 232 234 235 236 237 238 239 240 243 245 247 250

209. 2 4 6 8 11 14 17 19 20 22 23 26 27 29 30 32 35 36 38 39 40 44 49 50 53 55 58 60 61 62 63 64 65 66 67 68 69 70 71 74 78 79 83 84 89 90 92 93 97 99 104 106 108 110 112 114 116 118 124 125 126 127 128 129 132 134 135 136 140 145 146 147 153 155 159 160 162 163 164 165 166 167 168 171 175 176 177 178 182 183 185 188 191 195 197 198 199 201 204 205 206 207 208 210 211 213 214 215 216 218 219 220 221 222 223 224 226 230 232 234 235 237 238 240 241 243 244 245 247 248 249

210. 1 2 3 9 11 13 17 18 19 20 22 25 26 28 29 30 32 34 35 41 46 47 48 49 51 52 53 54 55 61 63 64 67 68 69 70 73 74 77 80 81 86 87 90 96 98 99 102 103 111 114 116 118 119 122 125 130 131 134 135 136 137 140 141 144 145 146 147 148 149 150 151 153 154 155 158 161 164 165 167 169 170 171 173 174 176 178 179 180 183 185 186 188 191 192 193 196 198 204 205 209 213 216 217 219 222 223 225 227 228 231 232 236 238 239 241 242 245 247 249

211. 1 2 3 6 9 10 12 13 17 19 21 23 26 27 29 30 34 36 37 38 41 42 46 48 51 52 55 57 58 59 63 69 70 73 77 79 80 81 83 84 85 86 87 93 94 95 98 99 102 103 104 105 108 110 112 114 116 119 120 122 123 124 125 126 132 136 137 139 140 141 142 146 148 149 150 152 154 155 158 163 165 166 169 170 171 173 176 179 180 181 184 188 190 193 198 199 200 203 204 205 209 216 217 218 220 221 225 228 230 232 233 234 235 237 238 239 240 241 243 244 246 247 248 249

212. 4 5 9 10 13 14 16 19 21 22 24 25 27 29 31 34 37 38 40 42 46 47 50 51 55 56 57 59 60 62 63 67 68 69 70 72 74 76 79 81 84 87 89 90 92 93 96 98 105 106 107 109 110 113 114 115 116 117 120 122 123 124 127 132 136 142 143 145 146 147 148 149 150 151 152 154 157 158 161 162 163 164 165 166 167 168 171 173 174 177 181 184 185 187 188 192 194 195 196 197 202 206 213 217 218 220 221 223 232 233 234 235 236 238 239 242 243 244 245 246 247

213. 1 2 3 4 7 8 10 11 12 14 17 18 19 20 23 24 28 30 31 32 33

34 37 38 39 42 43 44 45 47 51 54 56 58 60 62 63 66 67 68 70 71 73 74 75 76 78 79 80 81 83 84 86 88 92 93 94 97 98 100 104 108 116 117 122 123 124 126 128 133 134 136 137 139 141 143 144 145 148 149 154 160 161 164 167 168 169 170 171 173 178 184 186 189 190 194 195 198 200 203 204 206 208 209 210 212 215 216 217 218 219 220 223 224 225 226 228 231 232 233 235 236 238 239 249 250

214. 1 2 3 5 7 9 10 11 12 13 14 15 21 22 23 24 25 27 28 35 37 38 42 48 53 54 56 57 60 65 69 70 71 73 77 78 80 84 85 89 92 93 94 97 98 102 104 105 106 107 108 112 113 114 118 123 124 125 126 127 129 131 132 136 139 140 141 144 146 147 151 155 157 160 163 164 165 166 169 171 174 175 176 177 179 181 182 183 184 188 190 191 196 200 202 203 204 205 207 209 215 219 220 221 222 223 224 225 229 231 232 234 236 238 243 244 246 250

215. 1 2 7 9 12 15 16 20 23 24 26 27 28 29 31 32 34 35 36 38 39 40 46 47 54 55 58 62 65 66 67 68 69 70 72 73 74 75 76 77 78 80 83 85 91 92 93 96 97 99 100 102 103 104 105 107 108 112 113 114 115 117 118 119 120 122 123 124 125 127 129 131 132 133 136 137 138 143 146 147 153 154 155 156 157 158 159 164 165 166 170 171 173 176 178 179 181 183 184 185 186 192 194 197 198 199 203 205 208 209 213 214 217 218 219 221 224 225 226 229 232 233 234 236 237 239 243 244 246 250

216. 1 3 4 5 7 8 9 10 11 14 15 18 19 20 21 22 25 29 30 31 33 34 35 40 41 42 46 48 49 52 53 56 58 60 61 64 65 68 72 74 77 78 81 82 85 89 94 95 97 98 102 103 106 109 111 114 115 116 122 123 124 126 127 128 129 133 136 138 140 141 142 145 155 156 157 158 159 160 161 162 163 164 166 167 171 173 175 176 177 182 185 186 187 189 190 191 194 195 197 199 200 201 206 207 209 210 211 213 217 220 221 223 224 225 226 227 229 230 231 233 237 239 240 241 242 243 244 245 246 247 248

217. 3 4 6 9 11 12 13 17 18 23 25 26 29 30 32 33 34 35 42 44 46 47 48 51 53 60 62 63 64 65 66 68 70 73 75 76 77 78 80 82 85 86 88 89 91 92 93 94 98 100 104 107 113 115 119 124 125 126 127 131 134 136 137 146 148 150 151 152 154 156 161 162 163 164 165 168 169 172 174 175 178 179 184 185 186 188 189 190 192 194 196 198 201 202 204 210 211 212 213 215 216 219 220 222 224 228 229 232 234 236 237 238 239 242 245 250

218. 1 3 5 8 10 11 16 17 22 23 27 29 31 32 33 36 39 40 46 50 55 56 57 58 60 61 63 64 67 68 69 70 73 74 76 77 78 79 82 85 87 88 89 90 92 93 94 97 98 99 100 102 103 104 107 109 111 112 114 116 117 118 120 121 122 123 124 126 130 131 132 133 134 135 136 137 138 147 148 150 151 153 154 161 162 163 164 165 168 170 172 178 179 181 182 185 188 190 191 194 195 199 208 209 211 212 213 215 219

220 222 224 229 231 232 234 235 236 238 239 242 247 249 250
219. 2 3 4 5 6 8 10 11 13 22 23 25 27 31 32 33 37 41 45 48 49 50 51 52 53 54 55 56 58 59 60 62 63 67 68 72 74 76 79 81 82 83 84 88 89 95 96 97 98 100 102 104 105 106 107 108 109 112 115 116 119 120 122 123 125 126 128 129 131 132 134 135 137 138 139 140 141 142 143 144 145 146 147 155 156 157 158 160 167 168 170 171 173 175 177 180 182 183 187 188 189 190 192 202 204 206 207 209 210 213 214 215 217 218 220 223 230 235 236 237 238 240 245 246 247
220. 1 4 5 6 7 8 11 14 15 22 23 25 28 31 33 34 36 37 40 42 43 44 45 46 47 51 54 55 56 57 60 61 65 70 71 72 74 75 76 79 80 82 83 85 86 87 88 93 95 96 98 105 107 109 110 111 112 113 114 115 116 117 118 120 121 122 124 125 126 134 135 137 138 141 142 145 149 150 156 157 158 159 160 163 168 173 174 175 177 180 184 187 188 189 192 193 194 196 203 207 208 209 211 212 213 214 216 217 218 219 221 222 228 229 236 237 241 242 244 246 247 249
221. 9 12 13 17 19 22 23 25 28 29 33 34 36 37 39 43 44 45 48 49 51 52 53 55 57 58 59 60 61 63 65 66 69 70 72 73 74 76 77 78 80 81 82 84 85 86 88 89 90 91 92 94 97 98 99 102 103 104 111 113 114 117 120 121 122 123 126 127 131 134 135 138 139 140 142 144 146 147 149 150 154 156 160 164 165 166 168 170 171 174 175 180 182 186 190 192 199 200 201 203 204 206 207 208 209 211 212 214 215 216 220 222 223 224 233 236 237 238 239 241 242 246
222. 2 4 6 8 10 11 12 13 19 20 21 22 23 24 26 27 32 33 34 36 37 44 45 46 49 50 51 53 55 59 63 65 66 67 71 74 75 78 79 80 85 87 88 93 94 99 102 103 104 105 106 107 111 112 115 116 117 118 119 120 122 123 124 125 127 129 130 132 133 134 135 140 143 149 150 151 152 153 154 156 157 161 162 163 167 169 170 172 177 183 184 189 190 192 193 195 197 198 199 200 201 204 205 206 207 208 209 210 214 217 218 220 221 223 224 226 228 229 231 232 234 235 236 239 243 244 245 246 250
223. 1 4 6 8 9 10 16 18 20 21 23 25 27 28 30 31 33 34 36 47 48 51 53 55 58 60 61 63 64 67 68 70 71 73 75 76 77 78 80 82 83 85 92 94 96 97 98 99 100 101 103 104 107 111 112 113 114 115 116 117 118 122 123 124 128 132 133 135 138 140 142 144 146 150 156 159 160 163 164 168 169 170 171 172 175 178 179 181 184 186 187 188 189 190 191 193 194 195 196 199 201 202 204 205 208 209 210 212 213 214 216 219 221 222 224 225 226 231 232 233 234 235 236 238 241 242 243 244 247 248
224. 1 2 3 4 7 8 9 13 14 18 19 23 24 25 27 28 32 33 34 38 39 41 44 47 50 51 54 55 57 61 62 63 64 65 67 68 71 73 75 81 82 83 86 89 91 92 95 97 98 99 100 101 103 105 108 111 113 114 116 121 122 126 133 134 137 140 142 143 145 147 148 150 153 154 157 159 163 164

165 166 168 169 172 175 176 177 178 179 181 182 183 186 188 189 193 195 199 200 201 203 206 208 209 213 214 215 216 217 218 221 222 223 226 227 229 231 232 234 235 238 240 246 247 248 249

225. 1 5 6 7 8 15 16 17 18 19 21 24 28 29 32 35 37 39 42 43 44 48 53 55 56 61 62 67 68 70 71 72 73 74 75 79 86 87 88 90 91 96 99 101 102 105 106 109 110 113 114 116 117 118 121 123 129 131 132 136 137 141 142 143 145 146 147 156 158 160 162 165 168 169 172 173 174 176 179 183 186 187 193 195 196 197 199 201 202 204 205 207 208 210 211 213 214 215 216 223 226 229 230 233 234 239 240 241 243 248

226. 2 9 11 13 14 15 18 20 21 22 23 24 25 28 32 33 34 36 39 45 46 48 51 52 56 57 58 60 61 63 64 65 71 74 80 83 84 85 96 99 100 102 103 106 107 110 112 114 116 118 119 123 125 128 130 131 132 135 137 138 139 142 144 145 146 147 148 151 152 153 156 158 161 164 166 167 168 169 175 177 179 180 181 186 188 192 196 200 201 203 204 207 208 209 213 215 216 222 223 224 225 229 230 232 235 238 239 240 241 242 243 244 246 249 250

227. 1 3 4 5 6 7 8 10 11 12 14 15 16 17 18 20 21 22 23 24 25 26 27 28 29 31 32 34 36 37 38 39 41 42 43 45 46 47 49 50 53 54 56 58 60 63 69 71 72 78 79 85 86 87 89 91 92 93 97 100 101 105 106 107 108 109 111 112 113 114 117 118 120 122 123 124 126 127 129 135 136 137 138 141 142 143 146 148 150 151 154 155 158 159 161 163 164 166 167 168 169 172 175 176 177 179 182 184 185 187 188 189 192 195 196 197 199 203 204 205 208 210 216 224 228 229 231 234 235 237 239 244 245

228. 1 5 6 14 17 18 19 21 23 24 29 31 33 34 35 37 38 39 40 42 43 45 47 51 57 62 63 67 70 72 75 76 78 81 83 84 86 87 89 91 92 93 94 97 98 99 104 105 106 107 110 112 114 116 117 118 119 120 122 124 126 129 131 133 136 137 140 141 142 150 151 154 155 157 158 159 161 162 164 167 168 169 170 171 172 173 175 179 180 184 185 187 188 192 194 195 196 197 200 201 202 203 205 210 211 213 217 220 222 227 229 230 234 235 236 237 238 239 242 244 247 250

229. 1 3 6 7 8 14 15 16 17 18 21 24 32 34 35 36 38 39 40 41 42 44 45 46 47 48 49 50 51 54 56 58 59 60 61 62 64 67 72 75 76 77 79 83 85 86 87 88 89 90 92 93 94 95 97 105 108 109 111 114 115 116 120 122 123 124 126 127 130 133 135 136 138 139 140 142 143 148 149 150 153 154 156 157 159 163 169 173 174 176 177 180 186 187 189 192 194 197 198 204 205 206 208 214 215 216 217 218 220 222 224 225 226 227 228 230 232 234 239 240 242 243 244 245 246 249

230. 3 4 6 8 12 13 15 16 18 19 21 26 28 29 30 31 33 34 35 36 37 38 39 40 42 44 46 50 52 53 55 58 59 60 62 66 67 68 69 70 73 74 76 77 78 79 80 81 82 84 85 86 92 93 94 95 97 100 102 103 105 108 111

112 115 118 119 122 123 124 125 126 128 130 132 134 137 139 143
144 146 147 148 150 151 152 154 155 156 158 162 163 164 166 167
168 169 170 171 172 175 176 177 181 183 185 187 190 191 192 196
199 202 203 205 206 208 209 211 216 219 225 226 228 229 231 232
233 235 236 239 240 241 243 244 249 250

231. 1 4 6 7 8 9 11 14 15 16 17 18 21 23 24 25 29 34 36 38 40
41 43 46 48 49 50 52 54 55 57 58 59 61 62 64 65 67 69 70 77 83 85
87 90 91 92 93 94 95 96 100 101 102 103 105 107 109 110 112 113
115 116 118 119 121 125 126 130 131 132 136 137 138 139 140 143
146 147 148 149 151 153 154 155 156 159 160 161 162 164 165 166
167 168 170 171 173 182 184 187 189 190 191 193 196 197 199 201
203 206 208 210 213 214 216 218 222 223 224 227 230 232 235 236
238 240 244 245 246 247 248 249

232. 2 4 5 6 7 8 9 11 12 13 14 15 16 19 21 22 24 25 26 29 36 38
40 41 43 44 47 49 50 52 53 54 55 57 58 59 61 63 65 71 73 74 77 78
79 81 82 83 85 87 89 95 96 98 99 106 109 110 114 116 118 119 120
121 123 124 125 126 127 128 129 130 132 133 134 135 138 139 141
143 144 145 146 150 151 152 153 154 155 158 159 163 164 167 170
173 174 177 178 179 180 182 185 186 187 188 191 193 195 196 200
203 204 208 209 210 211 212 213 214 215 217 218 222 223 224 226
229 230 231 233 236 238 242 243 245 246 247 248

233. 2 3 5 8 9 12 18 20 22 23 26 27 28 29 31 32 33 34 35 38 39
42 44 45 46 50 51 56 58 60 61 62 63 69 70 71 73 74 75 76 79 80 82
83 84 87 90 91 93 94 95 98 99 102 103 104 105 107 108 110 117 120
124 125 127 129 132 134 135 136 139 140 141 142 143 146 149 150
153 155 156 159 166 168 172 173 174 176 177 179 180 181 182 184
185 186 187 188 189 190 191 193 195 204 205 211 212 213 215 216
221 223 225 230 232 234 236 237 239 241 245 246 247 248 249 250

234. 2 3 5 14 15 17 18 21 23 24 25 29 30 31 36 38 40 42 43 44
45 52 54 57 58 59 64 65 66 67 68 76 82 84 89 95 96 97 99 102 103
104 106 110 113 114 115 116 117 121 125 128 133 135 137 140 141
142 149 151 152 153 154 155 156 157 158 159 160 161 164 165 166
168 169 171 172 175 179 180 182 183 184 185 187 189 190 191 192
193 195 199 200 201 203 204 208 209 211 212 214 215 217 218 222
223 224 225 227 228 229 233 235 239 240 243 244 248 249 250

235. 3 5 8 11 12 15 16 19 20 26 28 29 31 33 34 38 39 40 43 44
45 47 49 50 52 57 64 65 67 68 71 73 75 77 78 80 81 84 91 93 97
101 104 105 109 115 119 122 127 130 131 139 142 143 148 151 153
154 159 163 164 166 172 173 180 181 187 190 191 192 194 195 197
198 201 202 205 206 207 208 209 211 212 213 218 219 222 223 224
226 227 228 230 231 234 237 238 239 245 248

236. 2 3 5 6 7 14 17 18 19 23 25 26 27 28 29 30 32 33 36 38 40

42 43 47 48 49 52 53 56 60 61 62 63 65 66 68 69 73 76 79 84 86 88 90 92 93 94 95 96 97 98 99 101 104 106 107 110 114 119 120 121 122 123 124 125 131 133 135 137 139 140 142 143 144 145 146 147 150 152 155 157 158 159 160 162 164 166 167 168 169 170 172 174 175 176 178 179 181 182 183 185 186 187 188 191 192 196 202 203 204 205 208 210 212 213 214 215 217 218 219 220 221 222 223 228 230 231 232 233 237 238 240 241 242 243 244 246 248 249 250

237. 4 5 8 9 11 12 14 15 16 17 19 25 26 28 32 34 35 36 37 38 40 43 45 47 48 49 50 52 53 54 57 59 60 61 62 63 66 67 68 70 73 74 75 77 78 79 81 84 87 88 89 90 91 94 95 97 98 99 100 101 102 108 109 110 111 117 119 120 122 123 124 125 126 127 129 131 134 139 140 141 145 148 149 151 152 154 157 160 162 164 166 167 169 170 171 174 178 179 187 188 191 192 193 196 199 202 204 208 209 211 215 216 217 219 220 221 227 228 233 235 236 238 242 245 250

238. 1 2 3 4 5 6 10 13 16 18 19 20 21 22 27 39 40 41 42 45 46 47 48 52 53 54 55 58 59 60 61 62 65 66 69 79 80 81 84 85 86 89 90 93 95 96 102 105 106 109 111 115 121 122 124 125 127 128 129 130 131 135 136 138 141 145 148 150 152 153 157 158 164 166 168 169 170 173 177 178 179 180 183 184 185 187 190 191 199 200 202 206 207 208 209 210 211 212 213 214 217 218 219 221 223 224 226 228 231 232 235 236 237 240 243 244 246 247 249 250

239. 2 3 4 5 8 13 14 17 18 20 21 23 24 26 28 29 36 37 38 39 40 42 48 49 53 55 59 60 61 64 66 68 69 70 71 72 73 74 76 78 79 81 83 84 85 86 87 92 93 97 98 99 100 102 105 106 107 108 110 117 118 120 126 128 130 133 136 137 139 142 143 144 145 146 155 158 161 163 164 168 169 177 179 180 182 183 184 191 193 194 196 197 200 201 202 204 205 206 208 210 211 212 213 215 216 217 218 221 222 225 226 227 228 229 230 233 234 235 241 244 245 247 249 250

240. 1 3 4 5 6 9 12 13 16 18 19 20 23 24 25 29 31 34 35 37 39 40 41 46 51 52 53 54 57 58 60 61 62 63 65 71 72 76 77 79 80 83 85 87 91 92 95 96 99 101 105 107 108 109 112 113 116 118 119 120 122 124 125 126 127 128 129 130 131 132 134 138 139 141 148 150 153 154 155 158 162 166 167 168 169 176 177 178 179 180 181 182 183 185 186 188 189 190 192 193 194 195 196 198 200 204 206 207 208 209 211 216 219 224 225 226 229 230 231 234 236 238 243 244 245 246 248 249

241. 2 3 6 7 8 10 11 16 18 19 25 26 27 30 31 33 36 38 40 41 42 43 44 45 47 49 50 51 53 55 57 58 59 60 63 68 69 70 71 73 74 78 79 80 82 88 89 90 91 92 94 96 98 105 107 108 109 112 113 114 115 116 121 122 125 127 129 132 134 136 137 138 140 141 142 143 147 148 149 152 154 155 157 158 161 162 166 167 169 174 177 178 184 190 192 193 194 196 197 202 203 205 206 209 210 211 216 220 221 223

225 226 230 233 236 239 242 244 245 246 247 248

242. 2 6 8 10 12 14 16 18 19 20 21 22 24 28 29 36 37 38 40 41 42 43 45 46 47 48 50 55 60 61 62 63 65 66 69 70 72 73 77 80 81 83 84 85 86 88 89 92 96 102 103 104 106 115 117 118 120 121 122 126 130 134 135 136 141 143 144 147 148 149 150 151 152 153 154 157 159 162 163 164 166 168 169 171 173 175 176 177 178 180 183 184 185 186 187 192 193 196 198 200 203 204 205 207 210 212 216 217 218 220 221 223 226 228 229 232 236 237 241 243 244 245 246 249 250

243. 14 17 19 20 22 24 26 28 29 30 31 34 36 41 42 43 44 46 57 58 61 62 63 65 66 67 68 69 71 76 79 82 84 85 87 90 91 93 96 97 101 104 105 107 109 110 113 114 120 121 122 126 127 128 132 133 136 137 143 145 147 151 154 157 159 160 161 163 164 167 168 169 170 173 174 175 177 179 181 182 183 185 186 187 188 191 192 194 195 198 201 205 206 207 208 209 211 212 214 215 216 222 223 225 226 229 230 232 234 236 238 240 242 244 245 246 248 249

244. 2 4 7 8 10 12 15 20 23 25 26 29 31 32 34 35 36 41 42 44 46 50 52 59 61 62 66 68 69 70 73 77 78 81 86 87 89 90 91 92 93 94 95 96 99 102 103 104 106 107 108 110 111 112 115 118 120 121 123 125 131 132 133 135 137 138 139 140 145 146 147 151 152 153 155 157 158 165 167 171 174 178 179 180 181 187 190 191 193 194 195 197 198 200 201 203 206 207 209 211 212 214 215 216 220 222 223 226 227 228 229 230 231 234 236 238 239 240 241 242 243 248 249

245. 1 2 7 8 9 10 11 12 13 18 20 25 26 27 29 31 32 34 36 40 41 43 44 46 48 49 50 52 54 55 57 60 64 66 69 71 73 75 77 78 79 80 81 82 83 84 86 89 91 92 93 96 98 100 101 102 103 104 107 109 113 114 115 119 122 124 125 127 128 131 135 138 139 140 144 145 147 149 151 152 154 155 159 160 162 165 170 172 174 175 176 179 180 183 184 186 187 188 190 194 195 202 204 205 206 208 209 210 212 216 217 219 222 227 229 231 232 233 235 237 239 240 241 242 243 248 249 250

246. 3 4 10 12 14 15 16 22 24 27 34 38 40 41 42 44 46 48 49 54 55 56 57 60 62 64 65 66 67 68 69 70 71 74 77 79 85 86 88 89 91 93 96 97 103 104 108 110 113 115 117 118 119 120 121 122 123 128 130 131 135 136 137 138 140 141 144 147 149 150 151 153 156 160 161 163 164 166 167 168 171 178 179 190 191 192 195 198 200 204 206 207 211 212 214 215 216 219 220 221 222 224 226 229 231 232 233 236 238 240 241 242 243 248 250

247. 1 2 3 4 5 7 9 10 11 14 15 16 17 18 19 21 22 23 25 28 29 32 33 34 35 36 38 40 41 42 45 46 48 49 50 52 54 56 58 60 62 66 67 71 72 73 75 76 78 79 80 83 85 87 94 95 97 99 100 101 102 104 110 116 117 120 123 124 129 130 133 134 135 136 137 139 141 143 145 148

149 150 151 152 154 157 163 164 168 169 170 171 173 174 178 180 183 184 186 188 192 196 198 199 200 201 203 204 206 208 209 210 211 212 216 218 219 220 223 224 228 231 232 233 238 239 241 250

248. 1 2 6 7 11 12 14 15 16 20 22 23 25 26 28 30 31 32 34 35 37 39 41 44 48 49 50 55 57 59 60 66 67 68 71 74 75 76 79 80 81 82 83 84 85 86 87 89 90 91 92 97 98 100 101 106 107 109 113 115 116 117 119 120 123 127 128 129 131 133 136 137 138 139 140 141 143 149 154 158 159 160 161 164 166 167 168 169 170 171 176 178 180 181 182 187 191 193 194 195 196 198 201 205 206 209 211 216 223 224 225 231 232 233 234 235 236 240 241 243 244 245 246 250

249. 1 7 9 12 15 17 20 21 22 23 24 26 28 29 31 33 34 35 36 39 40 43 46 48 49 50 51 52 53 55 56 57 59 62 67 72 79 82 84 86 87 89 92 96 98 100 104 105 106 109 110 111 114 115 117 118 123 127 129 130 131 132 133 135 146 147 148 151 155 156 157 158 159 162 163 167 168 169 170 171 172 174 175 185 187 188 189 190 194 197 198 200 201 206 207 209 210 211 213 218 220 224 226 229 230 231 233 234 236 238 239 240 242 243 244 245 250

250. 1 6 7 8 10 13 14 15 16 19 25 26 32 33 35 36 39 40 41 43 44 46 48 49 51 54 55 58 61 62 63 65 70 72 73 81 84 87 88 89 93 98 101 103 104 105 107 108 109 110 111 113 114 115 117 118 120 121 123 127 129 132 133 134 135 136 137 138 143 145 146 147 148 151 152 153 154 156 162 164 166 169 170 173 176 179 182 183 187 189 191 192 193 195 196 202 203 204 205 206 208 213 214 215 217 218 222 226 228 230 233 234 236 237 238 239 242 245 246 247 248 249

**GC29:**

1. 2 6 7 8 11 13 14 15 20 22 23 24 28 30 31 33 40 41 42 43 45 47 49 50 51 55 60 62 63 66 67 69 70 71 72 74 76 78 83 85 92 93 95 96 98 99 101 103 105 109 113 114 115 116 118 119 120 123 124 125 126 127 129 131 132 133 134 135 136 138 139 141 143 146 149 150 152 155 158 159 160 162 166 169 170 171 172 173 176 177 178 179 180 183 185 186 188 191 193 194 196 197 199 201 203 205 206 207 208 209 210 213 215 216 217 219 220 221 222 223 224 232 233 240 246 248 249

2. 1 3 5 6 8 9 10 12 13 14 19 20 21 22 23 24 26 27 28 29 30 32 33 35 36 37 41 42 45 46 47 48 49 55 60 61 63 67 68 69 70 71 73 75 77 79 81 82 83 86 87 89 90 92 96 100 101 102 103 109 110 111 113 117 118 124 125 126 127 135 136 137 138 140 143 144 146 147 148 149 150 151 152 153 157 158 160 161 162 163 165 166 167 168 170 171 173 175 176 177 179 180 182 185 190 194 196 197 198 199 203 207 208 209 213 214 215 216 218 219 220 221 224 225 226 228 231 232 235 236 237 239 244 245 248 249

3. 2 7 8 9 10 11 12 15 16 20 23 24 26 32 34 36 40 44 46 49 50 52 53 54 55 56 58 59 60 63 64 67 69 70 71 73 74 75 76 78 84 85 86 87 88 91 93 94 95 96 99 102 107 108 109 111 113 116 118 122 123 125 126 127 129 130 131 132 134 135 136 141 145 148 151 153 154 156 157 158 159 160 162 164 165 166 170 171 173 174 175 176 177 181 182 183 185 186 187 188 189 190 191 194 195 196 197 198 199 200 201 204 205 210 211 212 213 214 215 218 219 220 221 223 224 225 226 229 230 231 233 238 241 242 243 247 248 250

4. 5 7 10 12 13 14 16 17 18 20 23 25 28 29 30 32 34 35 37 38 39 42 44 46 47 49 51 52 53 57 59 62 63 67 68 69 71 75 80 81 85 87 88 89 90 93 94 95 96 99 102 103 104 105 108 110 113 116 118 124 126 128 130 138 139 141 142 143 144 145 147 148 155 158 159 160 162 163 166 167 168 170 173 174 177 178 179 180 181 183 185 187 188 190 192 193 196 197 201 204 206 207 208 210 211 212 214 217 218 219 220 221 224 226 228 229 234 236 241 244 245 248 249

5. 2 4 9 12 13 14 17 23 24 25 26 27 30 32 33 36 37 38 39 40 42 43 44 46 48 51 52 53 54 55 58 59 60 62 63 64 66 69 70 71 73 74 76 77 78 80 81 83 84 85 88 89 91 92 93 96 99 100 101 103 109 110 112 116 123 124 125 126 129 130 133 134 136 138 140 143 144 145 147 151 152 153 154 158 159 160 161 164 165 166 167 168 169 170 172 174 176 177 178 179 180 182 183 187 188 189 191 193 194 195 196 197 198 199 200 204 205 206 209 211 212 216 217 219 220 225 227 230 236 237 239 242 245 246 247

6. 1 2 8 10 12 14 17 19 24 28 29 30 31 34 36 39 40 41 43 47 50 53 54 58 60 62 66 70 72 73 76 77 85 86 87 88 90 93 96 97 101 104 105 109 111 112 114 119 120 122 123 125 126 128 130 132 133 136 137 138 139 146 147 149 150 151 153 156 157 158 160 163 164 166 167 168 169 170 171 172 174 175 176 178 179 180 183 184 185 187 188 190 191 193 195 196 198 200 201 203 204 206 211 219 220 222 223 224 225 228 230 234 236 238 247 248

7. 1 3 4 8 9 10 13 16 17 18 19 21 22 23 26 27 28 29 30 31 33 34 37 38 40 42 43 44 45 48 51 54 55 57 61 62 66 68 70 71 72 74 76 81 82 84 85 86 92 93 96 97 98 99 100 101 103 104 105 106 111 112 113 114 117 119 121 122 123 124 128 130 132 133 135 136 137 138 139 143 144 145 146 148 150 152 153 154 157 159 164 165 166 167 169 170 171 172 183 184 186 187 189 190 193 194 195 196 202 203 204 205 208 213 214 215 218 220 222 224 225 227 228 230 235 240 245 248

8. 1 2 3 6 7 12 13 14 15 16 18 22 23 24 25 29 34 35 36 38 41 43 44 45 46 47 48 50 51 54 55 65 67 70 71 73 76 77 78 79 81 84 85 86 88 92 94 95 96 97 98 99 100 101 103 104 105 106 107 108 110 111 117 118 124 126 129 130 131 132 133 135 136 137 138 140 144

146 147 150 151 153 154 157 159 161 164 166 171 172 173 178 179 181 185 186 188 189 190 191 193 194 195 196 200 202 203 205 208 210 213 216 220 224 225 226 229 230 231 234 235 243 244 245 248

9. 2 3 5 7 10 11 13 15 18 25 26 27 29 30 36 37 39 42 44 45 46 47 49 50 52 53 54 55 56 57 59 61 62 63 64 71 72 73 75 79 82 83 87 88 90 91 92 94 96 100 101 102 103 104 105 107 110 113 116 118 121 122 123 124 126 128 129 133 135 136 137 139 142 143 145 146 150 157 159 163 169 170 173 174 177 178 187 188 190 192 193 194 196 197 198 199 200 201 206 208 211 213 216 217 221 223 227 229 236 238 239 240 247 249

10. 2 3 4 6 7 9 12 13 14 15 16 20 21 23 24 28 29 30 35 37 38 39 40 43 45 56 61 64 66 67 68 70 74 78 79 81 82 83 84 87 88 89 91 92 93 94 95 96 97 98 100 105 106 108 110 111 118 119 124 128 129 130 134 135 136 137 139 140 142 143 144 147 148 149 151 155 158 160 161 163 164 166 169 171 172 173 174 176 180 181 184 185 187 189 193 195 197 198 205 207 208 209 213 214 216 218 222 224 225 227 229 234 235 236 237 239 242 245 246 248 249 250

11. 1 3 9 12 13 15 16 17 21 22 23 25 27 30 31 34 36 37 40 41 43 44 45 46 48 49 50 51 53 54 57 59 61 62 63 64 66 68 69 70 71 73 74 76 78 79 81 82 85 90 98 100 102 104 106 108 110 112 114 116 118 120 123 124 125 126 127 128 133 136 138 139 141 142 144 147 148 149 151 152 155 157 162 164 169 170 171 173 176 178 181 182 183 184 186 187 188 190 192 196 197 198 199 201 202 205 206 207 210 212 213 214 215 216 218 220 221 224 228 231 238 243 247 248

12. 2 3 4 5 6 8 10 11 13 15 16 19 20 21 23 24 29 31 33 34 38 39 40 42 43 44 45 47 49 50 53 56 58 60 64 66 68 71 78 79 80 82 84 85 87 88 89 90 92 94 95 97 99 100 101 102 104 105 107 108 113 121 123 125 126 128 131 132 138 139 142 148 149 151 152 155 159 161 164 165 166 168 169 171 172 173 174 175 178 179 181 182 185 186 188 189 190 191 198 201 204 207 212 214 216 218 219 223 229 232 233 236 237 240 242 243 244 246 247

13. 1 2 4 5 7 8 9 10 11 12 15 17 20 21 22 23 26 27 28 30 31 32 33 36 41 45 46 49 50 53 56 57 58 59 60 62 63 64 67 68 69 70 72 73 74 76 79 80 81 82 83 87 92 94 95 97 98 99 100 102 104 107 108 110 111 115 117 118 119 120 122 127 131 133 134 136 139 142 145 146 148 149 150 154 155 158 159 163 164 168 169 170 173 174 176 177 179 180 182 187 189 190 192 193 195 197 198 199 201 204 206 207 208 210 212 213 214 217 220 221 226 227 229 232 233 235 236 238 239 240 241 242 243 245 249

14. 1 2 4 5 6 8 10 16 18 20 21 22 23 28 31 32 33 34 35 37 39 40 41 42 43 44 46 48 53 58 59 61 62 63 64 65 70 71 73 74 75 76 77 78 79 84 85 88 89 90 91 92 93 95 96 97 99 100 102 104 105 107 109

110 111 112 115 116 120 121 122 126 127 128 131 133 134 138 139 141 143 148 151 153 155 156 158 159 160 161 162 163 165 167 168 169 171 174 176 179 180 181 182 188 191 193 194 197 198 199 203 204 208 210 211 214 218 221 223 229 230 232 234 236 238 241 242 244 246 248

15. 1 3 8 9 10 11 12 13 16 17 24 28 32 33 34 36 41 46 47 49 52 53 55 56 57 60 63 66 67 68 69 70 71 72 73 75 76 77 78 79 84 85 87 89 90 91 92 93 95 96 99 104 106 109 111 112 118 120 121 124 127 128 129 131 133 135 137 138 140 141 142 144 145 146 148 150 151 152 153 154 157 159 162 163 164 165 171 172 176 179 182 184 185 186 187 189 192 193 195 199 200 201 204 206 208 210 214 215 217 218 222 223 224 225 226 227 230 232 235 242 243 246 247 248 250

16. 3 4 7 8 10 11 12 14 15 17 18 21 22 25 26 38 39 40 41 42 43 44 46 47 48 50 51 53 54 56 57 58 59 60 64 66 67 69 71 72 74 76 78 79 80 81 83 85 86 87 88 93 97 98 99 101 102 104 106 108 111 112 114 116 119 120 121 123 127 128 130 131 132 134 137 138 141 143 144 145 146 148 150 152 153 154 156 157 160 162 163 164 165 166 167 169 170 171 172 173 174 175 178 180 183 184 186 188 189 190 191 192 193 194 196 199 203 205 207 208 212 213 215 217 218 219 221 222 223 225 227 228 230 231 233 237 239 240 241 244 245 246 247 248 249

17. 4 5 6 7 11 13 15 16 18 21 22 23 25 26 28 29 30 31 32 35 36 38 40 42 46 48 54 58 59 60 61 62 63 64 67 72 74 75 76 78 79 80 82 83 85 87 89 90 93 94 98 99 102 107 108 109 111 114 117 118 119 124 125 128 129 130 131 132 135 138 139 141 144 150 160 164 167 168 169 170 171 172 175 176 179 180 181 182 185 191 192 195 196 197 198 199 200 201 202 204 208 210 212 213 214 215 217 218 219 220 221 224 225 229 231 233 237 238 239 248

18. 4 7 8 9 14 16 17 19 21 22 23 24 27 28 29 31 32 34 35 36 37 38 40 42 44 45 47 48 52 54 57 60 61 62 63 65 66 69 70 75 76 77 78 80 82 83 84 85 86 88 89 90 91 92 97 100 103 106 107 108 110 111 113 114 115 116 117 118 119 120 121 125 126 127 137 138 140 142 144 146 149 151 154 158 159 160 163 166 167 169 175 176 177 178 182 183 185 186 189 190 192 195 198 200 204 205 208 210 211 212 215 217 219 220 221 224 225 227 228 230 234 235 237 243 245 246 250

19. 2 6 7 12 18 25 26 27 28 30 31 33 34 35 37 38 39 42 44 45 48 49 50 53 54 55 57 58 60 61 64 65 69 71 72 76 78 79 80 83 84 92 93 95 98 101 102 103 106 108 110 111 112 113 116 117 118 120 122 128 129 131 133 134 135 139 140 143 148 149 151 156 157 160 161 163 164 165 166 167 169 170 171 172 174 175 182 187 188 190 191 192 193 195 196 199 200 202 203 204 211 212 214 216 217 219 222

223 226 228 229 230 231 232 233 234 235 236 238 240 241 242 243 244 245 246 247 248 250

20. 1 2 3 4 10 12 13 14 24 26 27 28 30 34 36 37 38 42 43 46 48 50 53 55 59 60 61 63 65 67 68 76 78 79 81 84 87 89 93 94 95 97 98 99 101 102 103 104 105 106 107 108 112 113 115 116 117 119 120 122 127 128 129 132 135 136 139 140 145 148 149 150 151 152 153 154 158 161 165 167 169 170 171 172 174 175 178 179 182 184 187 189 190 192 194 195 196 197 198 200 202 206 209 210 213 218 219 220 222 223 224 226 228 229 230 232 234 236 237 238 240 241 242 244 246 248 250

21. 2 7 10 11 12 13 14 16 17 18 23 24 25 27 28 31 32 34 36 37 38 40 41 44 45 47 48 49 51 53 54 61 62 63 65 67 68 69 70 71 72 74 78 79 81 82 83 85 87 88 90 92 93 95 96 97 99 102 104 105 106 109 111 112 115 119 121 124 125 126 130 131 133 138 142 144 145 147 152 153 155 157 158 159 160 161 164 165 169 171 172 176 177 178 179 183 186 188 191 193 195 196 197 198 202 203 209 210 211 213 217 219 220 222 224 226 230 233 235 238 239 241 242 243 244 245 247 249 250

22. 1 2 7 8 11 13 14 16 17 18 26 29 33 35 36 37 39 41 43 46 47 48 49 53 54 59 62 63 65 66 67 68 69 72 75 76 79 80 82 86 87 88 91 93 95 96 98 99 106 107 113 114 118 119 122 123 124 127 128 129 130 133 134 135 138 140 141 142 143 146 149 151 153 154 157 158 160 168 170 177 180 182 183 184 185 186 188 191 194 199 206 207 211 212 213 215 217 218 219 223 224 225 226 228 229 230 231 232 233 236 237 238 247 248

23. 1 2 3 4 5 7 8 10 11 12 13 14 17 18 21 25 26 28 32 37 41 46 48 49 51 54 58 61 63 64 69 71 72 73 74 76 78 80 81 82 83 84 85 86 88 90 91 92 93 97 98 99 100 101 106 108 109 110 113 121 123 124 125 128 129 132 133 137 139 141 144 145 148 150 151 152 153 154 155 157 158 159 165 166 167 171 172 174 177 179 181 182 183 185 186 188 191 194 195 196 197 199 201 202 208 211 213 214 216 217 218 219 220 221 222 224 225 228 230 231 232 233 235 237 239 244 245 246 249

24. 1 2 3 5 6 8 10 12 15 18 20 21 28 33 34 35 36 39 41 42 45 46 47 48 51 52 53 54 56 62 64 65 68 69 70 71 76 78 82 83 84 85 88 92 93 94 96 98 100 101 102 103 104 105 106 112 113 118 119 121 125 126 127 130 132 135 136 138 145 149 150 151 153 156 157 160 161 165 166 167 168 170 173 179 184 185 186 188 191 193 194 196 197 198 199 200 203 204 206 207 208 210 211 212 216 217 219 221 224 225 226 231 232 235 236 238 240 243 245 246 247 248 249

25. 4 5 8 9 11 16 17 19 21 23 26 28 29 33 35 37 40 41 42 43 48 50 55 58 59 60 62 63 68 71 73 74 76 78 79 83 84 87 97 98 100 101

102 104 105 106 109 110 111 114 118 119 121 123 124 125 126 127 129 130 131 133 136 138 140 142 143 144 145 146 150 151 156 158 159 161 162 166 168 169 172 174 176 177 180 184 185 186 187 188 189 190 191 193 196 197 199 200 204 205 206 209 210 211 214 216 218 222 223 224 226 227 228 230 232 238 240 241 246 247 249

26. 2 3 5 7 9 13 16 17 19 20 22 23 25 28 29 35 36 37 39 40 41 42 46 47 49 52 54 56 62 63 67 68 70 73 74 76 77 78 79 81 82 83 84 85 88 89 92 93 94 99 100 104 112 114 116 117 120 121 122 123 126 128 131 132 136 146 149 150 151 152 155 158 159 160 162 164 166 167 168 169 172 173 176 177 178 181 184 186 187 188 189 190 192 194 195 196 199 201 204 205 206 208 209 210 216 217 218 219 221 224 225 226 228 230 232 234 238 239 242 247 248 249

27. 2 5 7 9 11 13 18 19 20 21 28 29 34 35 37 39 40 41 43 45 47 48 49 54 56 60 62 63 64 65 74 75 78 81 83 84 86 87 88 93 94 97 98 102 104 105 106 107 108 109 110 111 113 118 120 122 125 127 129 131 132 138 139 141 142 144 148 149 151 152 160 161 163 164 165 166 168 172 173 176 180 182 187 189 191 193 194 202 203 204 206 208 211 216 218 222 226 227 229 230 231 232 233 235 236 239 241 243 246

28. 1 2 4 6 7 10 13 14 15 17 18 19 20 21 23 24 25 26 27 29 33 35 37 42 44 45 46 48 54 55 56 57 62 63 65 66 73 75 76 77 78 81 83 84 87 91 92 95 96 97 100 104 105 106 111 112 113 114 115 119 120 121 124 125 128 131 139 142 144 145 148 150 153 154 156 158 159 161 163 164 167 168 169 172 174 175 181 183 184 188 189 192 194 195 198 200 202 204 205 209 210 211 212 213 215 216 217 218 219 220 222 224 227 228 230 233 234 235 237 238 240 241 242 244 245 246 248 249 250

29. 2 4 6 7 8 9 10 12 17 18 22 25 26 27 28 31 34 35 37 38 44 46 47 48 53 55 59 60 61 64 65 67 68 72 74 77 81 83 87 88 91 93 94 96 99 103 105 106 108 109 110 111 113 115 116 119 122 123 124 125 127 129 130 131 134 135 138 139 142 143 144 146 147 149 152 154 155 156 158 160 161 164 166 167 171 172 173 177 179 183 184 185 186 187 188 189 191 192 194 195 196 200 201 204 205 206 208 209 210 212 213 214 215 217 219 220 221 222 223 225 227 232 236 242 244 246 249

30. 1 2 4 5 6 7 9 10 11 13 17 19 20 32 34 35 36 38 40 41 42 43 45 47 48 51 52 55 58 59 61 62 63 64 65 66 68 69 70 72 75 77 78 79 80 81 82 90 91 93 94 96 97 101 102 103 104 106 110 111 114 115 116 118 121 123 124 132 134 137 138 144 145 148 152 153 155 157 166 167 172 173 175 176 179 180 181 182 184 185 186 187 189 191 192 197 205 206 209 221 222 223 227 228 231 233 234 236 237 238 241 243 245 246 248 249

31. 1 6 7 11 12 13 14 17 18 19 21 29 33 35 38 39 40 41 42 46 49 50 51 57 59 60 61 62 63 64 65 66 68 70 71 73 74 77 79 80 81 82 85 86 89 93 94 95 96 97 101 103 104 106 107 110 112 113 114 116 117 118 124 126 130 131 134 136 137 138 140 142 143 144 145 146 150 151 152 156 158 159 160 163 167 170 172 179 182 183 184 185 187 195 200 201 204 206 207 209 211 212 214 215 217 218 219 220 221 222 223 225 226 228 229 235 238 239 240 242 245 246 247 248 249 250

32. 2 3 4 5 13 14 15 17 18 21 23 30 39 40 41 43 45 46 47 48 49 50 52 60 62 64 65 67 70 71 72 73 74 78 80 81 82 85 86 87 93 94 97 98 101 102 103 106 107 108 109 110 111 113 114 117 118 122 123 124 127 128 132 135 136 138 139 144 145 147 148 150 152 153 154 155 156 159 162 164 167 173 175 177 182 183 185 186 190 191 192 193 194 195 198 200 201 203 207 208 211 214 215 223 224 225 226 230 232 233 234 236 238 239 243 244 246 247 248 249

33. 1 2 5 7 12 13 14 15 19 22 24 25 28 31 35 37 39 40 42 44 45 46 47 50 51 52 53 56 58 59 62 63 66 67 69 73 78 79 82 84 85 86 88 93 94 96 98 99 101 102 104 105 108 109 110 113 115 117 118 119 120 121 124 127 130 131 132 133 134 137 141 142 143 147 148 152 153 155 156 157 159 162 165 166 167 168 170 173 176 177 178 179 180 181 182 185 187 189 192 193 197 198 200 202 203 207 212 213 216 220 221 224 225 226 227 228 234 239 240 241 242 245 247 249 250

34. 3 4 6 7 8 11 12 14 15 18 19 20 21 24 27 29 30 35 36 39 40 41 42 43 46 48 49 50 53 57 62 63 66 67 73 75 76 77 79 81 83 86 87 88 89 92 93 94 97 98 100 101 102 104 109 110 111 114 115 117 118 120 122 125 127 128 132 133 135 138 145 157 158 159 161 162 164 165 170 172 174 175 176 178 181 182 184 186 188 191 192 193 196 197 198 199 202 203 204 205 206 207 211 214 217 218 220 221 224 228 229 230 235 236 237 239 241 242 243 244 246 247 248

35. 2 4 8 10 14 17 18 19 22 24 25 26 27 28 29 30 31 33 34 36 37 39 41 43 44 46 48 52 54 56 57 59 64 66 67 71 73 76 78 80 82 86 90 91 93 95 99 101 102 104 105 108 113 115 117 118 119 127 128 132 133 134 135 136 137 138 140 141 142 144 145 146 156 157 158 159 161 164 165 166 170 173 179 180 182 183 188 190 191 193 194 195 196 197 200 203 206 209 210 211 214 215 216 219 220 221 222 223 225 226 227 229 232 233 234 235 237 238 244 247 249 250

36. 2 3 5 6 8 9 11 13 15 17 18 20 21 22 24 26 30 34 35 39 40 41 42 43 44 47 49 51 53 57 58 60 64 65 68 69 74 75 76 78 79 80 83 85 88 89 94 96 99 100 101 102 104 106 107 111 114 115 119 122 125 129 130 137 139 145 146 147 148 149 156 157 159 160 165 166 168 170 171 172 173 174 175 177 178 179 181 182 183 184 186 188 189

191 193 194 197 199 200 201 204 206 208 210 212 214 215 216 217 218 221 222 223 228 231 232 233 236 237 238 240 244 245 247

37. 2 4 5 7 9 10 11 14 18 19 20 21 22 23 25 26 27 28 29 33 35 41 48 49 50 51 52 53 54 55 56 58 59 60 61 65 66 67 68 69 71 73 74 76 78 79 80 83 84 85 86 87 88 95 97 98 100 102 103 105 107 108 109 114 115 117 118 120 121 124 125 127 128 130 135 138 139 140 143 145 147 148 151 152 155 156 158 161 165 166 167 169 171 173 175 176 182 184 185 187 188 190 192 193 195 196 199 200 201 203 205 206 208 209 212 215 217 220 222 223 226 228 230 231 237 238 240 243 244 245 250

38. 4 5 7 8 10 12 16 17 18 19 20 21 29 30 31 43 44 46 47 49 50 52 53 54 55 56 61 62 64 68 69 70 73 74 75 77 79 84 85 86 87 88 89 90 91 93 94 96 97 99 100 101 102 103 106 108 109 110 113 114 116 122 126 128 129 131 132 135 140 142 143 145 152 154 159 161 162 163 164 165 167 168 170 172 177 182 183 187 188 193 194 196 200 204 206 207 209 211 213 215 218 219 220 221 225 226 227 228 229 231 233 234 239 243 245 247 248 250

39. 4 5 6 9 10 12 14 16 19 22 24 26 27 31 32 33 34 35 36 42 44 45 48 50 51 53 54 58 59 60 62 64 66 69 74 75 78 82 83 85 87 89 92 94 99 105 107 108 109 111 112 114 117 118 123 125 127 128 129 133 134 136 138 140 141 145 146 147 153 154 155 156 157 159 160 164 168 170 171 172 175 176 178 179 181 182 185 186 191 192 193 194 195 196 197 198 199 201 202 203 204 206 207 208 209 212 214 218 220 221 222 223 224 228 231 235 236 237 239 243 244 245 246 247 248

40. 1 3 5 6 7 10 11 12 14 16 17 18 21 25 26 27 30 31 32 33 34 36 41 42 44 46 47 48 49 51 52 56 58 59 62 63 69 70 71 72 73 74 76 77 78 82 84 85 89 91 93 94 95 96 97 98 99 101 102 103 104 110 112 113 114 115 116 117 123 124 131 132 133 134 136 139 142 144 146 148 149 154 155 159 162 164 165 166 167 168 170 171 172 175 176 178 179 180 181 182 187 190 191 192 193 195 196 197 198 199 200 202 203 205 206 207 212 214 215 216 218 219 222 225 228 229 233 236 237 239 244 247 248

41. 1 2 6 8 11 13 14 15 16 21 22 23 24 25 26 27 30 31 32 34 35 36 37 40 43 44 45 46 47 48 50 51 52 54 55 57 58 59 61 66 67 69 71 73 74 75 76 78 79 83 85 87 89 90 91 95 96 98 100 101 102 103 104 107 109 113 114 115 121 122 123 126 131 133 135 142 145 150 151 152 153 154 157 158 160 164 165 167 168 172 173 174 177 182 183 184 185 186 187 188 189 190 196 197 200 201 203 204 205 206 208 210 211 213 214 215 216 217 220 221 222 224 225 230 239 243 246 250

42. 1 2 4 5 7 9 12 14 16 17 18 19 20 24 25 26 28 30 31 33 34

36 39 40 44 45 46 47 48 49 51 52 54 56 57 58 59 60 61 62 63 67 68 69 71 73 75 76 79 83 84 85 86 88 89 92 93 95 98 99 104 106 108 111 114 118 119 120 123 125 126 128 130 132 133 134 137 139 146 149 151 152 154 155 157 160 161 162 164 166 167 168 169 170 171 175 176 179 180 183 189 194 199 203 204 205 207 210 211 212 213 215 216 219 223 224 229 230 234 235 238 239 245 246 247 249

43. 1 5 6 7 8 10 11 12 14 16 20 22 25 27 30 32 34 35 36 38 41 44 45 47 48 50 52 53 54 56 58 60 62 63 64 67 68 69 71 72 73 76 77 79 80 82 83 87 90 91 94 95 101 102 107 110 113 115 116 118 121 122 126 127 129 130 132 136 137 138 140 141 143 144 146 148 153 154 155 156 158 160 166 167 172 174 175 176 178 179 180 181 184 185 186 187 190 191 193 196 197 200 203 206 207 209 210 211 212 215 218 220 226 231 232 234 237 238 240 242 243 247 249 250

44. 3 4 5 7 8 9 11 12 14 16 18 19 21 28 29 33 35 36 38 39 40 41 42 43 45 50 51 53 57 58 59 60 62 63 65 66 67 70 71 76 77 80 81 83 85 86 87 92 93 94 96 97 98 99 100 101 102 103 104 106 109 110 115 117 120 122 123 129 130 131 132 135 136 138 139 143 145 146 147 150 152 154 155 159 160 162 163 164 166 167 169 171 172 174 178 179 180 181 183 184 186 192 195 197 200 201 202 203 204 206 207 208 211 212 216 217 218 219 222 223 224 226 227 229 230 231 232 233 234 235 237 239 240 244 245 248 250

45. 1 2 7 8 9 10 11 12 13 18 19 21 24 27 28 30 32 33 39 41 42 43 44 46 47 48 51 52 54 56 57 58 59 61 63 64 65 67 69 72 76 77 79 81 82 87 92 94 95 99 104 106 109 111 114 116 119 120 125 128 129 130 131 132 140 145 151 154 159 161 164 165 170 171 173 174 178 180 181 182 185 186 188 189 191 192 194 195 196 197 198 200 201 202 203 205 207 209 211 214 216 217 221 223 226 228 229 230 233 234 235 236 237 241 242 243 244 245 246 247 248

46. 2 3 4 5 8 9 11 13 14 15 16 17 20 22 23 24 26 28 29 31 32 33 34 35 38 40 41 42 45 47 49 50 52 55 56 59 60 63 64 68 72 73 74 75 76 78 81 82 83 88 95 96 99 100 103 107 110 111 112 114 118 120 121 125 127 128 129 130 131 132 138 140 143 144 145 146 147 155 160 162 169 170 172 173 175 176 177 178 179 180 181 182 184 185 187 188 189 191 193 194 199 200 202 203 204 205 207 210 211 212 213 214 215 218 219 220 222 223 225 226 227 228 230 232 233 235 236 237 242 247 248

47. 1 2 4 6 8 9 12 15 16 18 21 22 24 26 27 29 30 32 33 36 38 40 41 42 43 45 46 50 51 52 53 56 57 59 61 65 67 69 70 71 73 75 76 79 82 83 88 90 92 94 97 98 99 100 104 105 107 108 109 114 115 116 117 118 122 123 125 126 128 133 136 137 139 141 142 143 147 149 150 151 154 157 159 160 162 163 164 166 167 169 170 174 175 176 177 178 181 182 184 187 191 193 196 198 200 203 206 207 208 213

217 220 222 225 226 227 230 231 232 233 234 235 236 237 238 239 240 247

48. 2 5 7 8 11 14 16 17 18 19 20 21 22 23 24 25 27 28 29 30 32 34 35 37 39 40 41 42 43 45 51 54 56 57 58 59 60 61 69 72 73 74 76 78 80 82 86 87 88 89 90 92 93 94 95 96 99 100 101 104 105 107 108 111 112 117 118 122 123 127 128 130 133 136 137 138 139 140 142 143 144 147 148 149 150 152 153 157 158 160 162 163 165 172 173 174 175 184 185 187 188 190 194 195 196 198 199 202 208 211 212 213 215 217 218 220 223 224 225 226 227 228 231 234 236 237 239 243 246 250

49. 1 2 3 4 9 11 12 13 15 19 21 22 23 26 27 31 32 34 36 37 38 40 42 46 55 56 57 61 65 66 67 68 71 72 73 74 75 76 80 81 85 86 88 89 91 92 93 94 95 96 98 99 100 103 104 105 107 109 111 117 120 122 125 126 127 128 129 130 131 132 135 138 139 140 142 143 144 146 147 153 155 159 163 164 165 166 168 169 170 172 173 175 177 178 179 180 181 182 186 187 189 191 193 199 200 203 206 207 208 209 212 213 214 215 216 217 219 220 221 225 227 228 230 231 235 236 240 241 244 245 247 248

50. 1 3 6 8 9 11 12 13 16 19 20 25 31 32 33 34 37 38 39 41 43 44 46 47 51 54 56 57 61 63 66 69 70 71 72 75 77 78 80 82 84 86 87 90 92 94 95 96 101 102 103 104 105 107 111 112 114 116 117 119 120 121 122 123 126 127 128 131 132 133 135 143 144 145 146 152 154 156 157 158 160 167 173 177 180 182 183 185 186 188 189 192 193 194 196 197 199 200 201 202 203 205 206 210 211 212 213 217 220 226 227 228 230 231 233 234 235 236 240 241 244 247 248 250

51. 1 4 5 7 8 11 16 21 23 24 30 31 33 36 37 39 40 41 42 44 45 47 48 50 53 54 55 57 58 62 64 66 67 69 71 75 76 78 79 80 82 83 86 87 88 90 92 93 97 98 99 100 101 104 107 111 113 114 115 117 119 120 121 122 123 124 128 130 131 133 135 136 137 142 143 146 147 148 151 152 154 155 157 160 166 167 169 170 171 176 177 178 181 184 186 187 188 191 192 194 195 198 199 200 201 203 209 211 212 213 220 221 222 223 224 228 230 231 232 233 234 235 236 237 238 242 245 247 248 249

52. 3 4 5 9 15 18 24 26 30 32 33 35 37 38 40 41 42 43 45 46 47 53 54 55 56 57 61 63 64 66 67 69 71 72 74 75 76 77 81 82 84 87 88 90 93 95 97 99 100 102 105 106 107 108 112 115 116 117 119 120 123 124 127 129 132 134 135 140 142 149 153 155 156 157 158 159 160 161 164 171 173 178 179 182 184 187 189 190 193 195 197 201 202 203 204 206 211 212 213 218 219 220 222 224 225 226 228 230 232 235 236 238 239 240 243 244 245 247 248

53. 3 4 5 6 9 11 12 13 14 15 16 19 20 21 22 24 29 33 34 36 37 38 39 43 44 47 51 52 54 55 56 59 61 62 63 64 65 69 70 73 76 77 78

79 81 84 85 86 87 90 92 94 95 96 101 102 104 109 110 112 114 115 116 118 121 122 124 126 127 129 130 131 132 134 137 138 139 140 141 143 145 148 150 152 155 156 158 160 162 163 164 165 168 170 172 174 175 176 179 180 183 185 187 188 190 192 195 196 198 202 203 205 206 208 209 216 217 220 221 222 224 226 227 229 230 232 237 238 240 242 244 245 247 248 249 250

54. 3 5 6 7 8 9 11 16 17 18 19 21 22 23 24 26 27 28 35 37 38 39 41 42 43 45 48 50 51 52 53 56 58 59 62 63 64 67 69 70 71 72 75 76 77 80 85 88 90 91 92 93 95 100 101 102 103 105 107 108 110 116 118 119 126 128 134 135 137 138 140 141 143 144 146 147 155 156 160 163 164 167 171 172 174 175 178 181 182 186 189 190 191 192 193 199 202 205 209 215 216 222 223 224 231 234 236 237 239 241 242 246 247 248 249 250

55. 1 2 3 5 7 8 9 15 19 20 25 28 29 30 37 38 41 46 49 51 52 53 56 65 69 70 71 73 74 75 78 82 83 85 86 87 93 94 95 96 98 99 101 103 104 105 107 109 111 114 115 117 119 120 123 124 128 130 131 133 135 136 139 142 144 146 147 150 152 154 159 162 163 165 167 169 172 173 174 175 177 179 180 184 186 188 189 195 198 199 200 208 210 211 212 214 215 216 219 220 221 223 225 226 227 228 233 234 235 237 242 244 245 246 248

56. 3 9 10 12 13 15 16 24 26 27 28 33 35 37 38 40 42 43 45 46 47 48 49 50 52 53 54 55 57 58 62 65 66 67 68 69 74 75 76 78 81 86 87 88 89 90 91 94 95 100 101 104 110 112 114 117 118 119 121 122 123 128 131 132 133 135 136 137 138 139 140 141 142 143 144 145 146 150 151 156 158 160 164 165 166 167 168 171 174 175 179 180 181 184 186 187 188 192 194 195 196 197 198 199 200 201 202 205 206 212 213 214 216 218 223 224 230 233 236 237 238 240 244 245 246 249

57. 4 7 9 11 13 15 16 18 19 28 31 34 35 36 41 42 44 45 47 48 49 50 51 52 56 63 66 67 72 73 74 75 76 77 79 80 82 84 85 86 89 90 91 92 93 96 97 98 99 103 105 106 108 109 111 112 114 115 116 118 119 120 122 125 126 127 128 134 135 136 137 139 142 144 147 149 151 156 158 159 161 162 166 167 168 169 171 172 173 174 176 177 180 181 182 184 185 186 187 190 192 194 196 197 200 203 205 207 210 212 214 215 221 222 224 229 230 231 235 236 237 239 241 242 243 244 250

58. 3 5 6 12 13 14 16 17 19 23 25 30 33 36 37 39 40 41 42 43 44 45 48 51 54 56 59 62 63 65 67 70 82 83 88 90 93 96 97 98 99 100 101 102 106 113 120 121 122 124 125 127 128 130 132 133 135 138 139 140 141 142 143 144 145 146 148 149 154 155 156 158 160 163 164 168 169 172 174 175 177 178 179 180 183 184 187 189 190 191 193 194 196 197 198 199 201 202 203 204 205 206 209 211 212

217 218 219 220 222 223 224 225 227 228 230 231 232 233 237 238 243 247 248

59. 3 4 5 9 11 13 14 16 17 20 22 25 29 30 31 33 35 37 39 40 41 42 44 45 46 47 48 53 54 58 61 62 63 70 71 74 76 78 79 80 82 84 86 88 91 92 93 94 96 97 101 103 104 105 107 108 113 114 117 118 119 123 125 127 130 132 134 137 139 140 143 147 150 151 152 153 154 155 156 157 158 159 160 161 162 163 172 173 176 178 181 187 190 192 193 194 195 196 197 198 204 210 213 214 216 217 219 222 223 224 227 228 229 235 236 238 239 242 244 245 247 249

60. 1 2 3 5 6 12 13 15 16 17 18 19 20 25 27 29 31 32 36 37 39 42 43 44 46 48 61 63 67 68 69 72 73 74 78 80 88 89 91 92 96 99 103 104 105 106 107 111 114 115 118 119 125 126 129 130 131 132 135 136 140 141 143 144 145 147 149 152 153 155 156 157 158 159 160 161 162 163 164 165 173 174 175 178 179 183 185 186 189 190 191 195 200 207 211 212 213 215 218 219 220 223 225 226 227 230 231 232 233 236 241 243 244 245 248

61. 2 7 9 10 11 14 17 18 19 20 21 23 29 30 31 37 38 41 42 45 47 48 49 50 52 53 59 60 67 69 71 77 82 84 85 92 93 94 100 101 103 104 109 111 112 113 114 115 116 117 119 120 121 122 125 133 135 138 140 144 148 149 152 153 155 156 159 162 166 167 168 170 172 173 174 175 176 177 180 184 185 189 190 191 192 193 194 195 196 197 199 201 202 205 206 208 209 211 214 217 219 221 222 225 226 227 228 230 235 238 239 241 242 246 249

62. 1 4 5 6 7 9 11 13 14 17 18 21 22 24 25 26 27 28 30 31 32 33 34 38 39 40 42 43 44 51 53 54 56 58 59 63 65 66 70 75 76 77 78 79 81 82 84 85 86 89 91 93 94 97 98 99 100 101 102 106 107 108 109 112 113 114 115 116 117 119 120 121 122 126 127 128 130 131 133 135 136 142 143 144 147 148 151 152 153 154 159 160 165 166 167 174 175 178 179 180 183 184 185 186 187 188 189 190 193 195 196 198 199 200 201 202 204 208 209 211 212 214 215 217 218 219 220 222 223 224 225 226 227 231 234 235 236 239 241 245 246 250

63. 1 2 3 4 5 9 11 13 14 15 17 18 20 21 22 23 25 26 27 28 30 31 33 34 40 42 43 44 45 46 50 52 53 54 57 58 59 60 62 68 69 70 71 75 77 78 80 84 87 88 90 92 94 97 101 105 107 109 111 112 113 114 115 118 123 124 126 128 133 134 135 137 140 145 146 149 152 155 156 157 158 159 160 165 166 168 169 171 172 174 175 176 177 178 179 180 181 182 183 187 192 193 200 201 203 205 210 212 217 218 219 220 226 228 229 231 235 238 243 245 247 249

64. 3 5 9 10 11 12 13 14 16 17 19 23 24 27 29 30 31 32 35 36 38 39 43 45 46 51 52 53 54 66 69 72 73 74 75 78 79 81 86 87 88 89 91 93 95 96 100 101 102 108 109 110 111 112 114 115 116 118 120 122 127 128 129 130 131 132 135 138 141 144 147 148 150 154 156

157 158 164 167 169 173 177 180 181 182 184 187 188 189 193 198 202 205 210 211 213 216 221 222 227 228 229 232 235 240 243 245 246 249 250

65. 8 14 18 19 20 21 22 24 27 28 29 30 31 32 36 37 44 45 47 49 53 55 56 58 62 67 68 69 71 73 76 83 85 86 88 90 92 93 95 99 102 105 106 108 110 111 114 115 116 118 121 122 123 127 129 132 133 134 135 137 139 144 146 149 150 151 153 154 155 156 158 159 160 161 162 165 171 173 179 182 183 184 185 188 192 195 196 199 200 202 203 206 209 210 211 216 218 220 222 223 224 225 229 230 231 232 234 239 241 242 243 247 249

66. 1 5 6 7 10 11 12 15 16 18 22 28 30 31 33 34 35 37 39 41 44 49 50 51 52 56 57 62 64 67 69 70 71 76 83 87 90 92 93 99 101 102 105 110 111 119 122 124 127 128 129 133 134 137 138 140 142 143 145 147 148 149 150 151 152 153 156 157 161 163 168 172 176 177 178 179 181 184 187 189 193 194 196 197 199 201 204 207 208 212 214 215 216 220 223 226 227 228 229 230 231 232 233 236 238 239 241 242 243 244 245 246 247 249 250

67. 1 2 3 4 8 10 13 15 16 17 20 21 22 26 29 32 33 34 35 37 41 42 43 44 45 47 49 51 52 54 56 57 58 60 61 65 66 71 72 73 74 78 80 82 83 84 86 89 90 91 95 97 101 103 104 105 106 108 110 113 117 118 119 121 122 123 124 125 128 132 133 134 138 140 141 145 146 148 150 153 154 155 156 159 164 169 170 172 173 174 175 176 177 180 184 186 188 189 191 192 193 195 196 198 199 204 208 209 211 212 216 217 219 220 226 227 228 229 230 236 241 244 245 246 247 248

68. 2 4 7 10 11 12 13 15 20 21 22 24 25 26 29 30 31 36 37 38 42 43 46 49 56 60 63 65 69 73 74 75 77 79 80 81 84 85 86 88 89 90 91 92 95 96 103 104 107 109 111 112 114 115 117 118 122 123 125 126 127 131 132 133 134 140 141 142 146 149 151 152 155 158 160 161 162 164 165 167 171 172 173 179 180 181 182 184 185 188 189 190 192 196 198 200 201 202 204 206 210 212 214 215 216 217 218 219 221 223 224 228 230 231 233 234 236 238 239 241 242 244 246 247 248 249

69. 1 2 3 4 5 11 13 15 16 18 19 21 22 23 24 30 33 36 37 38 39 40 41 42 43 45 47 48 50 51 52 53 54 55 56 60 61 63 64 65 66 68 71 73 74 76 77 78 83 88 89 92 94 96 98 99 104 108 110 112 115 116 117 118 119 120 122 127 128 129 133 134 135 136 138 143 144 145 148 152 156 159 160 165 166 169 171 172 173 179 182 185 186 188 189 191 192 193 195 196 198 199 200 203 205 208 209 210 211 212 213 214 217 221 222 224 232 234 235 237 238 239 240 242 243 246 247 249

70. 1 2 3 5 6 7 8 10 11 13 14 15 18 21 24 26 30 31 32 38 40 44

47 50 53 54 55 58 59 62 63 66 71 73 75 77 78 80 81 82 83 85 91 94 95 96 97 99 100 101 102 104 106 107 110 111 113 115 116 117 119 124 125 128 131 132 134 135 137 138 139 140 141 144 151 152 153 157 158 162 163 164 170 172 173 176 177 178 183 184 185 186 187 192 195 200 201 202 204 205 207 211 212 213 214 215 217 219 221 222 223 226 227 228 229 232 233 238 240 241 242 243 245 249 250

71. 1 2 3 4 5 7 8 9 11 12 14 15 16 19 21 23 24 25 31 32 35 37 40 41 42 43 44 47 49 50 51 52 54 55 59 61 63 65 66 67 69 70 73 75 79 80 81 82 85 86 88 90 92 97 98 100 104 105 106 107 108 111 112 113 115 117 118 119 120 121 123 125 126 127 128 130 131 132 135 137 143 147 148 150 153 157 158 159 162 163 166 171 173 174 176 178 179 180 185 186 187 188 189 192 193 201 206 211 214 215 216 217 220 221 222 225 226 229 230 233 234 235 236 239 240 242 244 247 250

72. 1 6 7 9 13 15 16 17 19 21 22 23 29 30 32 40 43 45 46 48 49 50 52 54 57 60 64 67 73 76 80 81 82 83 84 86 87 88 91 93 96 97 98 100 101 102 104 105 106 107 109 110 111 114 116 118 120 121 122 124 125 126 129 130 136 138 139 140 142 148 149 156 157 158 160 161 164 168 169 170 171 173 174 179 180 181 182 183 185 186 188 190 192 193 194 195 198 203 205 206 207 208 209 210 213 214 215 218 223 227 230 231 232 234 235 236 237 241 243 244 245 246 248 249 250

73. 2 3 5 6 8 9 11 13 14 15 23 25 26 28 31 32 33 34 35 37 38 40 41 42 43 46 47 48 49 53 55 57 60 64 65 67 68 69 70 71 72 77 80 81 82 86 88 89 93 98 100 104 105 106 109 111 112 113 116 117 119 121 122 124 126 128 130 131 136 137 138 139 143 146 148 149 150 151 152 157 158 160 162 165 166 169 173 174 176 177 183 189 192 193 194 195 196 201 202 203 204 206 207 210 216 217 218 219 221 222 225 226 231 234 236 237 240 242 248 249 250

74. 1 3 5 7 10 11 13 14 16 17 21 23 25 26 27 29 31 32 36 37 38 39 40 41 46 48 49 52 55 56 57 59 60 64 67 68 69 75 80 81 82 83 84 86 87 89 90 91 93 95 96 98 99 100 104 105 106 109 112 113 114 115 118 119 122 124 125 127 129 130 131 133 134 135 137 139 141 142 145 148 151 152 153 156 157 161 162 163 164 166 167 168 170 172 173 175 176 183 187 188 190 191 192 195 196 199 205 207 208 210 211 217 219 220 223 226 227 229 232 235 236 237 238 244 245 248 249 250

75. 2 3 4 9 14 15 17 18 22 27 28 30 34 36 38 39 41 42 46 47 49 50 51 52 54 55 56 57 62 63 64 68 70 71 74 76 80 82 83 84 85 86 88 90 91 92 95 96 97 98 99 100 102 104 105 106 108 109 111 112 113 115 116 117 118 120 122 127 128 134 135 138 140 141 143 145 148 149 152 154 155 157 158 159 160 165 167 168 170 171 174 177 179

180 182 183 184 187 189 190 191 193 196 197 201 205 206 207 208 210 211 214 218 219 220 221 225 226 227 228 230 231 232 234 236 237 240 243 245 246

76. 1 3 5 6 7 8 11 13 14 15 16 17 18 19 20 22 23 24 25 26 28 34 35 36 37 40 41 42 43 44 45 46 47 48 49 51 52 53 54 56 57 59 62 65 66 69 72 75 81 82 84 88 89 90 91 94 97 105 106 107 108 111 112 113 116 117 118 119 122 123 124 125 126 128 129 130 133 134 135 136 137 138 139 141 142 144 148 149 150 151 152 155 157 158 161 162 163 166 167 168 169 170 175 176 180 185 186 187 189 190 191 192 194 196 198 206 207 208 209 210 212 213 214 215 217 219 221 222 224 228 231 232 233 234 235 236 240 241 243 244 247 248 249

77. 2 5 6 8 14 15 18 26 28 29 30 31 34 38 40 43 44 45 50 52 53 54 57 61 62 63 68 69 70 73 82 84 85 88 89 91 93 97 98 100 103 105 109 113 114 115 118 122 123 124 126 127 128 129 130 133 135 136 137 138 139 143 145 146 149 152 155 156 158 159 161 162 163 164 165 168 170 172 175 178 179 181 182 183 184 185 186 188 189 191 192 193 196 198 199 200 202 204 205 207 209 210 212 213 214 215 217 220 221 222 223 224 225 227 229 230 231 232 233 236 237 238 239 240 243 248 250

78. 1 3 5 8 10 11 12 14 15 16 17 18 19 20 21 23 24 25 26 27 28 30 32 33 35 36 37 39 40 41 46 48 50 51 53 55 56 59 60 62 63 64 67 69 70 79 80 82 83 85 86 88 89 93 96 98 103 106 108 111 112 113 114 115 116 117 118 119 120 121 122 126 128 129 131 134 136 140 142 145 146 147 149 150 152 153 154 155 157 158 161 163 164 168 170 172 175 176 178 180 182 186 193 194 195 196 198 202 205 208 209 210 211 212 213 214 218 219 221 222 223 224 226 227 228 230 231 233 234 236 237 238 239 241 242 243 244 245 246 249

79. 2 8 9 10 11 12 13 14 15 16 17 19 20 21 22 25 26 30 31 33 34 36 37 38 41 42 43 45 47 51 53 57 59 62 64 68 71 78 81 83 85 86 87 88 90 91 92 96 98 100 101 102 103 104 105 108 109 110 111 113 114 117 120 121 124 126 127 130 132 135 137 138 143 144 145 146 153 156 157 158 159 160 162 164 166 171 175 177 178 180 181 183 185 189 190 191 193 194 195 196 197 199 200 201 202 204 205 206 208 210 211 213 215 217 219 220 224 225 231 232 233 234 235 236 237 239 241 245 246 247 248

80. 4 5 12 13 16 17 18 19 22 23 30 31 32 35 36 37 43 44 48 49 50 51 54 57 59 60 63 67 68 70 71 72 73 74 75 78 81 82 84 85 86 88 89 90 92 93 94 99 102 104 107 109 111 114 116 121 123 124 126 129 130 131 132 133 134 135 141 143 144 145 146 147 148 149 150 152 153 155 157 159 162 163 165 168 171 173 174 179 183 184 185 187 189 192 194 196 198 200 204 205 207 208 211 213 214 215 216 217 219 220 223 224 226 229 230 231 234 235 237 238 240 242 243 245

247 248 249 250

81. 2 4 5 7 8 10 11 13 16 20 21 23 26 27 28 29 30 31 32 34 44 45 46 49 52 53 56 62 64 68 70 71 72 73 74 76 79 80 88 89 92 93 95 96 97 100 101 102 103 105 107 110 114 115 117 122 128 129 130 131 132 133 134 137 138 140 142 145 148 149 152 153 157 159 161 162 163 168 171 172 175 177 180 182 185 188 189 190 191 192 198 199 200 201 206 209 210 211 212 213 215 216 217 218 222 223 226 229 232 233 236 237 239 244 245 247 248

82. 2 7 9 10 11 12 13 17 18 21 22 23 24 26 30 31 32 33 35 39 40 43 45 46 47 48 50 51 52 55 57 58 59 61 62 67 70 71 72 73 74 75 76 77 78 80 84 85 88 89 91 94 95 98 101 104 106 110 113 116 117 122 124 127 129 133 137 139 143 145 146 148 150 151 152 153 155 157 160 161 163 166 168 169 170 171 172 173 174 175 176 178 179 181 182 184 185 186 188 190 191 192 193 199 201 202 204 205 206 207 212 213 219 221 222 223 225 226 231 233 234 235 236 237 239 241 243 244 245 248 250

83. 1 2 5 9 10 13 16 17 18 19 21 23 24 25 26 27 28 29 34 36 37 39 41 42 43 44 46 47 51 55 58 65 66 67 69 70 72 74 75 78 79 84 87 88 90 96 98 102 105 109 110 111 112 115 116 122 123 125 127 137 142 143 144 145 146 148 150 152 153 156 157 159 163 164 166 167 169 170 172 173 175 176 179 184 185 186 187 188 192 197 198 200 202 204 205 206 207 210 212 213 214 217 218 222 225 226 228 229 231 232 235 236 237 238 239 240 242 244 246 248 250

84. 3 5 7 8 10 12 14 15 18 19 20 23 24 25 26 27 28 33 37 38 40 42 50 52 53 57 59 61 62 63 67 68 72 74 75 76 77 80 82 83 86 87 88 89 90 92 94 95 100 101 103 105 106 107 108 109 112 113 115 117 118 121 123 125 128 129 130 131 133 134 135 137 138 139 143 144 145 147 150 151 152 153 157 158 159 162 163 165 168 171 172 173 175 176 180 181 183 184 187 188 191 193 198 199 202 203 204 206 208 210 211 216 221 225 226 227 228 230 231 232 234 236 238 239 240 242 243 244 245 247 248 249 250

85. 1 3 4 5 6 7 8 11 12 14 15 16 17 18 21 23 24 26 31 32 33 36 37 38 39 40 41 42 44 49 53 54 55 57 61 62 65 68 70 71 75 77 78 79 80 82 86 87 90 95 97 103 106 107 112 113 114 115 118 121 123 124 125 126 127 128 130 133 136 138 139 142 143 145 148 149 150 151 153 154 158 159 160 161 165 168 171 173 175 176 177 178 179 181 182 193 196 198 199 203 205 207 208 210 211 216 219 220 223 224 228 229 235 237 241 244 245 248

86. 2 3 6 7 8 16 18 22 23 27 31 32 33 34 35 37 38 42 44 48 49 50 51 53 55 56 57 59 62 64 65 67 68 71 72 73 74 75 78 79 80 84 85 87 89 93 94 96 97 98 101 102 103 104 105 106 107 109 111 112 113 116 118 119 120 122 123 124 125 126 127 129 130 131 134 135 136

137 138 140 142 146 147 148 150 151 152 153 154 156 159 160 167 168 169 170 172 174 176 179 180 181 182 183 185 186 189 191 192 194 195 197 198 199 201 202 205 206 207 208 211 213 214 216 218 219 221 222 223 224 229 230 232 233 234 237 238 239 240 242 244 248 249 250

87. 2 3 4 6 9 10 12 13 15 16 17 20 21 22 25 27 28 29 32 34 37 38 39 41 43 44 45 48 50 51 52 53 55 56 63 64 66 72 74 79 83 84 85 86 97 98 99 104 105 109 111 112 114 115 117 119 122 124 125 126 129 134 135 137 138 142 145 146 147 151 154 156 160 162 166 171 173 175 177 180 182 184 197 198 199 200 201 202 203 204 205 208 212 213 219 220 222 225 227 228 229 231 232 234 235 236 238 239 242 243 245 250

88. 3 4 5 6 8 9 10 12 14 16 18 21 22 23 24 26 27 29 33 34 36 37 38 42 46 47 48 49 51 52 54 56 58 59 60 63 64 65 68 69 71 72 73 75 76 77 78 79 80 81 82 83 84 89 90 91 97 99 100 105 117 119 120 122 124 126 127 128 129 133 134 135 137 138 140 141 144 145 147 149 153 154 157 163 165 166 168 170 172 173 175 176 179 181 182 183 184 187 188 189 190 191 192 195 197 200 201 204 205 208 210 213 214 218 221 222 224 225 229 231 232 234 237 238 239 241 242 243 244 245 246 249

89. 2 4 5 10 12 14 15 17 18 20 26 31 34 36 38 39 40 41 42 48 49 56 57 60 62 64 67 68 69 73 74 76 77 78 80 81 82 84 86 88 90 91 93 94 95 97 99 103 105 108 110 111 114 115 117 118 122 127 131 132 133 134 135 137 138 140 141 143 145 146 149 150 153 154 156 159 160 162 164 165 166 167 169 170 171 172 173 174 175 177 179 180 182 186 187 188 190 194 196 198 199 200 203 204 205 211 212 213 216 218 221 225 226 229 230 232 234 235 236 237 238 240 242 243 244 245 247 248 249

90. 2 4 6 9 11 12 14 15 17 18 21 23 30 35 38 41 43 47 48 50 51 52 53 54 56 57 58 63 65 66 67 68 71 74 75 76 79 80 83 84 85 88 89 91 92 95 96 97 99 107 109 112 113 117 119 123 124 125 127 128 129 135 139 144 145 146 150 151 152 157 162 164 165 166 167 178 181 185 189 190 192 197 198 199 200 202 204 205 206 207 209 211 214 215 216 217 222 224 225 226 231 232 234 235 239 240 241 246 247 249

91. 3 5 9 10 14 15 18 22 23 28 29 30 35 38 40 41 43 49 54 56 57 59 60 62 64 67 68 70 72 74 75 76 77 79 82 88 89 90 93 94 95 99 101 104 107 108 109 110 114 118 123 124 125 126 127 131 137 138 141 143 145 148 151 153 154 157 158 160 165 170 172 173 177 178 180 189 191 192 193 194 195 196 199 202 203 207 208 209 210 212 214 216 218 219 221 222 223 225 226 227 229 230 233 234 236 237 238 241 242 243 247 250

92. 1 2 5 7 8 9 10 12 13 14 15 18 19 21 23 24 26 28 34 39 42 44 45 47 48 49 50 51 53 54 57 59 60 61 63 65 66 68 69 71 75 79 80 81 84 90 94 98 99 103 104 105 107 109 111 113 114 115 118 120 121 122 124 129 130 131 132 133 135 138 139 141 145 147 148 154 155 158 160 161 163 166 169 170 171 173 174 178 183 184 187 190 191 196 197 199 202 205 206 208 209 211 214 215 216 217 219 220 221 223 224 225 226 230 232 233 236 241 242 243 247 250

93. 1 3 4 5 6 7 10 14 15 16 17 19 20 21 22 23 24 26 27 29 30 31 32 33 34 35 38 40 42 44 48 49 51 52 54 55 57 58 59 61 62 64 65 66 72 73 74 77 78 80 81 86 89 91 94 95 97 98 102 103 106 107 109 112 113 114 115 117 122 123 125 127 128 133 137 139 141 145 146 147 149 152 154 156 157 158 161 162 170 171 172 173 176 177 184 187 190 192 193 196 197 198 199 201 207 208 209 214 215 216 217 218 222 223 224 228 229 230 231 234 240 241 243 245 247 249

94. 3 4 8 9 10 12 13 17 20 24 26 27 29 30 31 32 33 34 36 38 39 40 43 44 45 47 48 49 50 53 55 56 59 61 62 63 69 70 76 80 82 84 86 89 91 92 93 95 96 98 99 100 101 102 103 105 107 108 109 110 112 114 116 117 119 123 124 128 129 130 131 133 137 138 140 145 147 148 150 154 155 157 159 164 166 168 169 172 174 177 178 181 182 184 186 189 191 192 194 196 197 198 199 204 205 209 210 211 212 213 214 215 217 218 219 220 222 223 225 226 227 228 230 232 233 234 236 237 238 241 245 247 250

95. 1 3 4 8 10 12 13 14 15 19 20 21 22 28 31 35 37 40 41 42 43 45 46 48 49 50 52 53 54 55 56 64 65 67 68 70 74 75 81 82 84 85 89 90 91 93 94 96 97 98 100 101 102 105 109 110 113 116 118 119 121 122 126 127 130 131 134 135 137 139 141 143 145 149 150 151 153 155 156 161 162 163 165 167 168 173 176 178 181 184 186 187 188 189 194 197 201 206 209 211 212 213 214 215 218 219 220 222 224 227 228 229 230 231 232 234 237 238 241 242 245 248 250

96. 1 2 3 4 5 6 7 8 9 10 14 15 21 22 24 28 29 30 31 33 36 38 40 41 44 46 48 49 50 53 55 57 58 59 60 64 68 69 70 72 74 75 78 79 81 83 86 90 94 95 98 100 103 105 106 107 111 113 115 117 118 119 120 124 129 130 132 133 134 135 136 137 138 139 140 143 144 150 151 160 162 163 164 166 167 168 169 170 172 175 176 177 179 180 182 185 187 188 190 191 192 194 195 196 197 199 202 204 205 206 207 208 209 212 213 214 216 218 223 224 226 227 228 230 235 242 246 250

97. 6 7 8 10 12 13 14 16 18 20 21 23 25 27 28 30 31 32 34 37 38 40 44 47 51 52 57 58 59 62 63 67 70 71 72 75 76 77 81 85 86 87 88 89 90 93 95 98 101 103 104 106 107 108 109 111 112 114 115 116 117 118 119 121 122 125 126 129 130 131 132 137 138 139 141 143 145 147 150 152 155 156 160 162 163 164 167 168 169 171 172 173

174 175 176 177 179 180 185 187 189 195 196 198 201 202 206 208 213 214 215 218 219 221 223 225 227 228 229 231 235 238 239 243 244 248

98. 1 7 8 10 11 13 16 17 19 20 22 23 24 25 27 32 33 34 37 40 41 42 44 47 49 51 55 57 58 62 69 71 72 73 74 75 77 78 79 82 83 86 87 92 93 94 95 96 97 101 103 104 108 110 111 113 114 115 116 117 118 119 123 125 127 128 129 130 131 132 133 134 137 138 141 142 145 147 150 152 154 155 156 168 172 176 177 180 186 187 188 190 192 196 197 199 200 201 202 204 205 206 207 208 209 210 212 213 215 217 218 219 223 224 228 229 231 234 237 239 243 246 249 250

99. 1 3 4 5 7 8 12 13 14 15 16 17 20 21 22 23 26 29 33 35 36 38 39 40 42 44 45 46 47 48 49 51 52 55 57 58 60 62 65 66 69 70 74 75 80 87 88 89 90 91 92 94 101 102 103 109 112 115 120 125 126 127 130 132 133 135 138 141 142 145 146 147 148 149 150 151 153 154 156 157 161 162 166 173 174 175 176 177 179 181 183 186 189 190 193 195 199 202 203 204 208 209 211 212 214 216 218 219 220 221 223 225 227 228 229 230 231 232 233 234 238 239 240 242 243 250

100. 2 5 7 8 9 10 11 12 13 14 18 23 24 25 26 28 34 36 37 38 41 44 46 47 48 49 51 52 54 56 58 61 62 64 70 71 72 73 74 75 77 79 81 84 88 94 95 96 101 106 107 108 109 110 111 114 117 118 119 120 123 124 125 127 129 131 132 133 134 136 138 140 143 145 146 147 148 149 153 154 155 157 158 159 160 161 163 164 168 170 172 174 176 178 179 183 186 187 189 192 193 194 198 201 202 203 204 206 211 214 215 216 218 219 221 223 224 225 228 230 231 232 237 238 240 241 243 244 247 249 250

101. 1 2 5 6 7 8 9 12 16 19 20 23 24 25 30 31 32 33 34 35 36 38 40 41 43 44 48 50 51 53 54 55 56 58 59 61 62 63 64 66 67 70 72 79 81 82 84 86 91 94 95 97 98 99 100 103 105 107 108 112 114 120 122 125 129 135 137 138 142 147 148 151 154 159 160 163 165 168 171 173 174 176 178 179 181 182 183 185 186 187 188 190 191 193 194 195 196 197 198 199 200 201 203 204 208 214 216 217 221 224 225 226 229 230 231 233 235 237 238 239 241 243 245 246 247 250

102. 2 3 4 9 11 12 13 14 16 17 19 20 21 24 25 27 30 32 33 34 35 36 37 38 40 41 43 44 50 52 53 54 58 62 64 65 66 70 72 75 79 80 81 83 86 93 94 95 99 104 109 110 112 114 115 117 119 120 122 123 124 126 127 128 129 130 131 133 134 138 140 144 146 148 149 151 152 153 156 157 158 162 163 164 165 167 168 171 173 175 176 179 180 181 182 183 186 187 188 192 193 194 196 197 199 201 202 203 204 207 208 209 210 213 215 217 219 227 231 232 234 239 240 242 244 246 249 250

103. 1 2 4 5 7 8 9 18 19 20 24 29 30 31 32 37 38 40 41 44 46 49

50 54 55 57 59 60 61 67 68 77 78 79 81 84 85 86 89 92 93 94 96 97 98 99 101 104 106 108 113 114 115 116 118 119 120 121 122 126 127 131 132 133 136 141 146 147 148 151 152 153 156 158 161 163 165 166 167 169 171 172 174 177 178 179 180 182 185 187 188 189 195 197 199 202 207 213 214 215 216 217 218 221 222 223 227 230 232 233 234 235 236 237 238 239 240 241 245 247

104. 4 6 7 8 9 11 12 13 14 15 16 20 21 24 25 26 27 28 30 31 33 34 35 36 40 41 42 44 45 47 48 49 50 51 53 55 56 59 60 61 67 68 69 70 71 72 73 74 75 79 80 82 86 87 91 92 97 98 102 103 105 107 110 112 113 114 116 117 118 119 120 123 124 125 126 128 129 133 134 135 136 137 140 141 142 143 145 147 148 149 150 151 156 157 159 161 163 164 166 167 170 171 173 174 179 180 182 183 185 190 191 192 193 196 199 200 201 202 204 207 211 213 216 217 218 223 225 229 230 232 234 235 236 238 240 242 243 245 246 247 248 249 250

105. 1 4 6 7 8 9 10 12 14 20 21 24 25 27 28 29 33 35 37 39 47 48 49 50 52 54 55 57 59 60 63 65 66 67 71 72 73 74 75 76 77 79 81 83 84 86 87 88 89 92 94 95 96 101 104 107 109 111 112 115 116 117 118 119 120 121 125 126 130 132 133 135 145 147 148 153 160 161 162 167 169 170 171 172 173 175 178 181 182 183 184 186 190 192 193 194 196 200 203 205 206 207 208 209 213 215 217 223 224 226 232 235 238 239 240 241 244 248 249 250

106. 7 8 10 11 15 16 18 19 20 21 22 23 24 25 27 28 29 30 31 32 36 38 42 44 45 52 57 58 60 62 65 67 70 71 72 73 74 75 76 78 82 84 85 86 93 96 97 100 103 108 109 112 115 116 117 121 125 128 132 136 141 142 148 150 151 153 156 157 159 162 163 165 167 172 173 179 180 182 183 184 185 187 189 190 193 197 201 203 204 205 206 208 209 211 215 216 221 222 224 225 228 229 230 233 242 243 247 249 250

107. 3 8 9 12 13 14 17 18 20 22 27 31 32 36 37 39 41 43 46 47 48 49 50 51 52 54 55 59 60 62 63 68 70 71 72 76 80 81 84 85 86 90 91 92 93 94 96 97 100 101 104 105 109 111 112 115 116 118 119 120 121 123 126 128 131 132 133 139 140 141 142 143 144 145 147 148 149 151 152 153 154 155 158 161 163 164 165 168 170 171 174 175 177 178 179 186 188 189 190 191 194 195 197 204 207 208 211 213 215 216 220 222 227 228 230 232 233 234 237 239 241 242 243 244 245 248 249 250

108. 3 4 8 10 11 12 13 16 17 18 19 20 23 27 29 32 33 35 37 38 39 42 47 48 52 54 57 59 62 64 65 67 69 71 75 76 78 79 84 89 91 94 97 98 100 101 103 106 112 113 114 115 119 121 124 125 126 127 128 129 131 136 140 141 142 147 148 149 150 151 154 155 156 157 159 162 166 170 171 172 174 177 178 179 180 181 182 185 186 190 191 194 195 196 197 198 200 201 205 206 207 208 211 216 219 220 222

224 230 233 238 241 244 246 247 248 250

109. 1 2 3 5 6 14 15 17 21 23 25 27 29 32 33 34 37 38 39 41 44 45 47 49 53 55 57 61 62 63 64 68 72 73 74 75 77 79 80 83 84 86 87 90 91 92 93 94 95 97 99 100 102 105 106 107 112 113 114 115 116 122 123 124 127 128 130 131 133 135 136 138 139 143 146 149 150 151 152 153 155 159 160 162 163 164 165 166 172 174 176 185 188 189 190 193 199 200 201 205 207 208 212 215 217 218 220 223 224 226 231 233 235 237 238 242 243 244 245 248 250

110. 2 4 5 8 9 10 11 13 14 18 19 23 25 27 29 30 31 32 33 34 38 40 43 44 46 53 54 56 64 65 66 67 69 70 72 79 81 82 83 89 91 94 95 98 100 102 104 112 113 114 115 116 117 118 121 122 125 127 128 129 131 134 135 136 144 145 146 147 148 151 152 154 157 159 162 164 165 168 171 172 173 175 179 183 184 186 188 189 190 193 195 196 197 198 199 200 201 202 203 205 206 211 212 214 217 219 220 228 229 230 231 232 233 235 240 242 247

111. 2 3 6 7 8 10 13 14 15 16 17 18 19 21 25 27 28 29 30 32 34 36 39 42 45 46 48 49 50 51 55 57 60 61 63 64 65 66 68 70 71 72 73 75 76 78 79 80 83 86 87 89 92 96 97 98 100 105 107 113 115 118 120 123 124 125 126 127 128 129 133 134 135 136 137 138 139 140 141 143 144 147 148 149 150 151 152 154 158 161 162 168 170 171 174 175 176 177 179 180 184 185 186 187 190 194 195 197 198 200 204 205 207 211 212 216 217 220 221 222 224 227 229 230 232 233 234 235 236 237 239 240 241 242 243 244 245 246 248 249 250

112. 5 6 7 11 14 15 16 19 20 21 24 26 28 31 39 40 46 48 50 52 53 56 57 61 62 63 64 68 69 71 73 74 75 76 78 83 84 85 86 87 90 93 94 97 99 101 102 104 105 106 107 108 109 110 113 115 116 117 121 122 125 128 129 133 136 137 138 139 140 141 143 144 145 148 150 152 155 156 158 159 160 161 164 166 167 168 170 172 176 177 178 180 183 187 189 190 191 194 196 197 200 203 204 206 208 212 214 218 219 220 222 223 224 228 229 230 233 237 239 241 245 246 248 249 250

113. 1 2 3 4 7 9 12 18 19 20 22 23 24 27 28 29 31 32 33 35 38 40 41 43 51 58 59 61 62 63 67 70 71 73 74 75 76 77 78 79 82 84 85 86 90 92 93 95 96 98 103 104 108 109 110 111 112 114 116 117 119 121 123 124 125 126 130 131 132 133 137 139 140 144 146 147 148 149 151 152 154 155 157 158 163 165 167 171 173 174 177 178 180 183 185 186 189 192 193 194 199 200 201 202 204 206 208 209 212 213 214 217 219 220 221 222 225 228 230 234 237 239 242 243 244 248 250

114. 1 6 7 11 16 17 18 22 25 26 28 30 31 32 34 36 37 38 39 40 41 42 45 46 47 50 51 53 55 56 57 59 60 61 62 63 64 65 68 72 74 77 78 79 80 81 85 87 89 91 92 93 94 97 98 100 101 102 103 104 108

109 110 113 115 116 118 119 122 123 125 126 127 130 132 141 143 144 145 147 148 151 154 155 156 161 162 164 166 167 168 169 172 176 178 181 183 185 186 187 188 189 191 193 198 203 204 206 207 208 210 215 217 219 220 221 225 226 228 231 232 235 236 239 240 241 243 246 249

115. 1 13 14 18 20 21 28 29 30 33 34 35 36 37 40 41 43 44 47 51 52 53 55 57 60 61 62 63 64 65 68 69 70 71 74 75 77 78 81 83 84 85 87 89 92 93 96 97 98 99 102 103 105 106 107 108 109 110 111 112 114 116 117 119 122 124 126 128 130 131 134 135 137 139 141 142 145 148 149 150 152 157 159 161 163 166 168 169 170 173 174 176 177 179 180 181 185 186 193 196 198 199 202 205 206 208 209 210 211 217 218 219 222 224 225 226 231 232 234 237 238 239 240 241 242 244 246 247 249

116. 1 3 4 5 9 11 14 16 18 19 20 26 29 30 31 38 40 43 45 47 50 52 53 54 57 61 62 64 65 69 70 72 73 75 76 78 80 82 83 86 94 95 97 98 103 104 105 106 107 109 110 112 113 114 115 118 121 122 123 124 127 128 129 133 135 136 140 141 145 146 148 150 151 152 153 156 157 164 166 167 169 170 172 174 175 176 177 178 179 184 185 187 192 193 195 196 202 203 205 209 210 213 216 221 224 229 231 233 235 237 238 240 241 243 246 247 248 250

117. 2 7 8 13 17 18 19 20 26 31 32 33 34 35 37 39 40 44 47 48 49 50 51 52 55 56 59 61 62 67 68 69 70 71 73 75 76 78 79 81 82 84 87 88 89 90 93 94 96 97 98 100 102 104 105 106 110 112 113 115 118 119 121 122 123 124 125 127 130 131 132 133 134 137 138 139 140 141 142 144 148 150 159 160 161 167 174 179 182 183 184 185 190 191 192 194 195 197 198 199 203 205 210 211 214 216 217 220 224 225 229 232 234 235 236 237 238 240 241 244 245 248 250

118. 1 2 3 4 8 9 10 11 13 15 17 18 19 22 24 25 27 30 31 32 33 34 35 37 39 42 43 46 47 48 53 54 56 57 59 60 63 64 65 67 68 69 71 72 74 75 76 77 78 84 85 86 89 91 92 95 96 97 98 100 103 104 105 107 110 111 114 116 117 119 122 123 124 126 127 128 129 133 135 136 137 139 140 143 144 149 154 155 156 157 159 161 163 164 166 167 168 169 170 171 172 173 174 175 178 179 180 182 183 184 185 188 189 190 191 192 193 194 200 201 203 204 208 209 211 213 214 215 217 218 220 227 228 229 230 231 233 234 235 236 237 242 243 245 246 247 250

119. 1 6 7 10 13 16 17 18 20 21 22 24 25 28 29 33 35 36 42 45 50 51 52 54 55 56 57 59 60 61 62 66 67 69 70 71 73 74 76 78 86 87 88 90 94 95 96 97 98 100 102 103 104 105 107 108 113 114 115 117 118 121 122 127 128 129 133 136 137 142 145 150 154 155 156 159 160 161 169 177 178 179 182 185 187 188 189 191 192 193 194 195 196 199 200 203 208 209 212 213 214 216 220 221 222 223 225 230

231 232 233 237 238 239 240 242 243 244 245 247 249

120. 1 6 11 13 14 15 16 18 19 20 26 27 28 33 34 37 42 44 45 46 49 50 51 52 55 57 58 61 62 64 69 71 72 75 78 79 86 88 92 96 99 100 101 102 103 104 105 107 111 121 124 125 129 130 131 133 134 137 139 142 143 144 146 147 148 149 150 151 157 160 165 166 167 171 172 173 175 176 179 184 187 190 193 195 197 198 200 201 202 203 204 208 210 211 213 214 215 216 217 218 220 222 223 227 230 237 240 242 243 244 246 247 248 249

121. 7 9 12 14 15 16 18 21 23 24 25 26 28 30 33 37 41 43 46 50 51 53 56 58 61 62 65 67 71 72 73 78 79 80 84 85 92 95 97 103 105 106 107 108 110 112 113 116 117 119 120 124 125 126 127 129 130 131 132 137 138 139 142 145 146 147 149 155 159 161 163 171 173 177 179 180 185 186 188 190 191 193 195 197 198 199 200 201 203 204 205 209 210 211 213 214 215 218 220 221 223 225 228 229 231 235 237 238 239 240 242 243 245 246 247 249 250

122. 3 6 7 9 13 14 19 20 22 26 27 29 32 34 36 38 41 43 44 47 48 49 50 51 53 56 57 58 61 62 64 65 66 67 68 69 72 73 74 75 76 77 78 81 82 83 86 87 88 89 92 93 95 97 101 102 103 109 110 112 114 115 116 117 118 119 123 126 128 130 131 132 133 137 143 144 145 147 150 151 152 154 159 160 161 164 165 166 168 169 171 172 173 174 177 178 180 183 187 188 189 190 191 192 193 195 197 200 203 204 206 210 211 213 214 215 218 219 220 222 223 224 226 229 231 233 234 235 239 240 241 243 244 246 247 248 249 250

123. 1 3 5 6 7 9 11 12 16 22 23 25 26 29 30 32 39 40 41 42 44 47 48 50 51 52 55 56 59 63 65 67 68 71 76 77 80 83 84 85 86 90 91 93 94 98 100 102 104 107 109 111 113 114 116 117 118 122 124 125 127 128 129 130 131 134 136 138 139 143 147 148 149 150 151 153 157 161 164 166 168 169 170 171 175 176 178 179 180 182 185 186 187 189 190 191 192 193 194 196 198 200 201 202 203 209 210 211 216 219 220 221 222 223 224 225 228 231 233 234 239 241 242 244 245 246 247 248

124. 1 2 4 5 7 8 9 10 11 15 17 21 22 23 25 28 29 30 31 32 33 37 40 51 52 53 55 58 63 66 67 70 72 73 74 76 77 79 80 82 85 86 87 88 90 91 92 94 96 100 102 104 108 109 111 113 115 116 117 118 120 121 123 126 127 129 131 133 134 140 141 144 145 150 153 156 157 158 162 163 164 165 167 168 171 172 173 178 181 183 184 185 186 188 191 193 200 201 203 204 205 206 208 210 213 214 217 223 225 229 230 233 238 239 242 243 245 246 248 250

125. 1 2 3 5 6 11 12 17 18 21 23 24 25 27 28 29 34 36 37 39 42 45 46 47 49 57 58 59 60 61 67 68 70 71 72 74 76 83 84 85 86 87 90 91 93 97 98 99 100 101 104 105 106 108 110 111 112 113 114 117 120 121 123 127 128 129 130 131 132 133 135 137 138 139 140 142

143 144 145 147 149 151 153 155 156 159 163 164 165 169 170 171 172 173 174 175 177 179 180 181 183 184 185 188 189 190 192 194 199 201 202 205 207 208 210 212 214 217 218 220 223 224 225 226 227 228 230 234 235 236 240 241 242 243 244 247

126. 1 2 3 4 5 6 8 9 11 12 14 18 21 24 25 26 31 38 41 42 43 47 49 50 53 54 57 60 62 63 68 71 72 73 76 77 78 79 80 85 86 87 88 91 95 97 99 102 103 104 105 107 108 111 113 114 115 118 121 122 124 128 129 132 133 135 137 139 140 141 145 146 147 152 157 159 160 162 164 165 169 170 172 174 176 177 179 181 182 183 188 189 193 194 196 197 198 199 200 202 205 206 207 208 209 214 215 218 219 221 222 227 228 233 237 238 239 240 243 244 245 246 249

127. 1 2 3 11 13 14 15 16 18 20 22 24 25 27 29 32 33 34 35 37 39 43 46 48 49 50 52 53 57 58 59 62 64 65 66 68 69 71 74 75 77 79 82 83 85 86 88 89 90 91 93 95 98 99 100 102 103 108 109 110 111 114 116 117 118 119 121 123 124 125 128 130 131 132 135 136 139 140 142 143 144 146 148 149 150 156 157 159 161 163 165 168 169 170 171 174 177 178 180 181 182 183 185 191 192 194 195 196 197 199 200 202 207 211 212 213 215 216 219 220 224 225 226 227 229 232 233 234 236 238 244 248 249

128. 4 6 7 9 10 11 12 14 15 16 17 19 20 22 23 26 28 32 34 35 37 38 39 42 45 46 47 48 49 50 51 54 55 56 57 58 62 63 64 66 67 69 70 71 73 75 76 77 78 81 84 85 88 90 93 94 98 102 104 106 107 108 109 110 111 112 115 116 118 119 122 123 125 126 127 129 130 131 132 134 135 137 140 141 145 151 153 154 156 162 163 164 170 173 175 176 180 183 184 190 191 194 195 196 197 199 200 207 209 211 212 215 217 222 224 225 228 229 230 231 236 238 239 240 242 243 245 247 249

129. 1 3 5 8 9 10 15 17 19 20 22 23 25 27 29 36 38 39 43 44 45 46 49 52 53 60 64 65 66 69 72 74 76 77 78 80 81 82 84 86 87 88 90 92 94 96 97 98 100 101 102 104 108 110 111 112 116 118 119 120 121 123 124 125 126 128 133 135 136 137 141 144 145 147 148 150 152 153 154 155 156 157 161 162 163 164 165 167 168 169 170 175 176 177 178 181 183 188 190 191 192 196 199 200 201 203 204 209 210 217 220 222 223 224 226 228 232 233 236 237 238 249

130. 3 4 5 6 7 8 10 16 17 21 22 24 25 29 31 33 36 37 42 43 44 45 46 48 49 51 53 55 58 59 60 62 64 71 72 73 74 76 77 79 80 81 84 85 86 92 94 95 96 97 98 99 102 105 109 113 114 115 117 120 121 122 123 125 127 128 139 140 141 142 147 149 152 153 154 155 157 160 161 162 165 168 169 172 173 176 177 179 181 182 184 185 186 189 191 192 193 195 198 199 201 205 206 209 212 214 216 217 219 220 221 224 227 231 233 235 236 239 240 241 243 244 245 246 248 250

131. 1 3 8 12 13 14 15 16 17 19 21 25 26 27 28 29 31 33 38 40 41 44 45 46 49 50 51 53 55 56 60 62 64 68 70 71 73 74 78 80 81 84 86 89 91 92 94 95 97 98 100 102 103 107 108 109 110 113 115 117 120 121 122 123 124 125 127 128 136 141 142 143 144 145 146 147 149 154 158 159 165 168 169 174 176 177 178 183 186 188 189 190 191 193 194 196 198 199 200 201 202 204 207 208 210 212 217 218 222 226 227 230 231 232 235 238 239 240 241 246 247 248 249

132. 1 3 6 7 8 12 16 17 20 23 24 26 27 30 32 33 34 35 38 40 42 43 44 45 46 49 50 52 53 56 58 59 60 64 65 67 68 70 71 79 80 81 89 92 96 97 98 99 100 103 105 106 107 113 114 117 121 122 125 126 127 128 133 137 138 139 140 142 143 144 146 147 148 149 152 154 155 160 161 162 164 167 168 170 173 176 179 182 183 185 189 192 195 196 199 203 204 205 206 207 208 209 211 212 213 214 215 217 219 220 223 225 228 232 233 234 235 237 238 242 244 245 247 249

133. 1 5 6 7 8 9 11 13 14 15 19 21 22 23 25 33 34 35 39 40 41 42 47 48 50 51 55 56 58 61 62 63 65 66 67 68 69 74 76 77 80 81 82 84 85 88 89 92 93 94 96 98 99 100 102 103 104 105 107 109 111 112 113 116 117 118 119 120 122 124 125 126 129 132 134 135 136 137 140 141 143 144 146 152 154 155 156 157 159 162 163 164 165 168 169 172 173 179 182 184 185 186 187 188 189 192 194 196 198 199 200 201 203 204 205 206 209 213 214 216 217 223 224 226 229 230 233 235 236 237 240 243 245

134. 1 3 5 10 13 14 16 19 22 29 30 31 33 35 39 40 42 52 53 54 57 59 63 65 66 67 68 69 70 74 75 76 78 80 81 84 86 87 88 89 95 96 98 100 102 104 110 111 115 117 120 123 124 128 133 136 143 144 146 148 154 158 164 165 167 169 172 174 180 182 187 188 191 194 195 199 200 203 207 208 212 213 216 217 218 220 221 224 225 226 227 229 232 234 235 237 238 240 241 243 248

135. 1 2 3 7 8 9 10 15 17 19 20 22 24 29 32 34 35 37 38 41 44 49 50 51 52 54 55 56 57 58 60 61 62 63 64 65 69 70 71 74 75 76 77 79 80 84 86 87 88 89 90 92 95 96 99 101 104 105 109 110 111 115 116 118 125 126 127 128 129 133 136 138 139 140 141 142 145 146 150 151 154 156 159 160 162 165 166 168 171 174 175 176 178 180 184 185 186 187 189 190 194 195 196 198 199 202 203 204 209 210 215 219 220 221 224 226 227 230 232 233 235 236 238 241 242 243 244 248

136. 1 2 3 5 6 7 8 9 10 11 13 20 24 25 26 31 32 35 39 40 43 44 47 48 51 55 56 57 60 62 69 72 73 76 77 78 85 86 96 100 103 104 106 108 109 110 111 112 116 118 119 123 127 129 131 133 134 135 138 141 143 144 145 146 148 149 150 151 155 156 158 159 162 167 169 170 175 176 177 183 185 186 187 189 191 192 195 196 197 198 199 201 202 203 204 205 207 208 209 213 215 217 221 223 224 226

230 233 234 235 236 238 240 242 244 246 247 250

137. 2 6 7 8 9 10 15 16 18 23 30 31 33 35 36 42 43 47 48 51 53 54 56 57 59 63 65 66 70 71 73 74 76 77 79 81 82 83 84 86 87 88 89 91 93 94 95 96 97 98 101 104 111 112 113 115 117 118 119 120 121 122 125 126 128 129 132 133 140 141 146 148 149 151 152 154 155 156 157 159 160 161 163 164 165 167 171 172 173 174 176 178 180 181 184 186 188 189 190 192 193 194 197 205 208 209 210 213 217 220 222 223 227 228 229 230 231 233 235 238 239 241 242 247 248 250

138. 1 2 4 5 6 7 8 11 12 14 15 16 17 18 21 22 24 25 27 29 30 31 32 34 35 37 39 43 44 46 48 49 53 54 56 58 61 64 66 67 69 70 72 73 75 76 77 79 81 84 85 86 87 88 89 91 92 94 96 97 98 99 100 101 102 109 111 112 117 121 123 125 132 135 136 139 141 142 144 148 149 151 153 154 156 157 160 161 162 165 166 167 169 170 173 177 179 185 186 187 189 190 192 193 194 195 197 198 200 201 202 203 204 205 206 207 211 212 213 214 215 216 217 218 219 220 222 225 227 233 235 241 242 243 244 245 246 249 250

139. 1 4 6 7 9 10 11 12 13 14 17 19 20 23 27 28 29 32 36 37 40 42 44 47 48 49 53 55 56 57 58 59 65 70 72 73 74 76 77 82 84 85 90 92 93 95 96 97 107 109 111 112 113 115 117 118 120 121 123 125 126 127 130 132 135 138 140 141 142 143 146 147 148 150 151 152 153 154 155 157 158 160 161 162 163 164 165 166 167 170 174 175 176 180 181 182 183 184 185 186 188 189 190 191 193 194 197 198 199 200 201 202 207 210 211 213 214 216 219 221 224 225 227 232 236 238 240 242 243 244 247

140. 2 5 8 10 15 18 19 20 22 25 31 35 37 38 39 43 45 46 48 49 52 53 54 56 58 59 60 61 63 66 67 68 70 72 75 78 81 86 88 89 94 96 100 102 104 107 108 111 112 113 116 117 118 124 125 126 127 128 130 132 133 135 137 139 142 143 147 148 152 155 156 157 165 166 167 170 173 174 176 178 182 184 186 187 188 189 190 191 196 206 207 209 213 214 217 219 221 223 224 227 228 229 230 234 235 237 238 242 245 246 247

141. 1 3 4 11 14 15 16 17 22 23 27 33 35 39 43 47 53 54 56 58 60 64 67 68 70 74 75 76 80 88 89 91 92 93 95 97 98 99 103 104 106 107 108 111 112 114 115 116 117 124 126 128 129 130 131 133 135 136 137 138 139 145 149 150 152 155 156 157 158 159 160 163 164 165 167 169 171 173 174 175 177 185 186 188 190 193 196 198 200 202 204 205 206 207 210 214 216 217 218 219 220 221 227 228 230 231 232 233 234 238 240 242 243 246 247 248 250

142. 4 9 10 11 12 13 15 18 21 22 25 27 28 29 31 33 35 38 40 41 47 48 49 51 52 55 56 57 58 62 66 68 72 74 76 78 81 83 85 86 87 98 99 101 104 106 107 108 115 117 119 120 121 125 127 130 131 132

135 138 139 140 144 148 150 156 158 159 160 162 165 167 170 171 175 177 178 180 181 182 183 184 185 187 188 189 191 192 194 195 198 199 200 201 202 203 205 206 207 208 209 211 215 218 220 222 224 225 226 228 230 234 235 238 240 242 243 244 245 250

143. 1 2 4 5 7 9 10 14 16 19 22 25 29 31 33 37 38 43 44 46 47 48 49 50 51 53 54 56 58 59 60 62 66 69 71 73 75 77 79 80 82 83 84 85 89 91 95 96 97 100 104 107 109 111 112 114 118 120 122 123 125 127 131 132 133 134 136 139 140 145 146 149 152 160 161 164 165 166 169 172 173 174 175 177 178 180 184 185 188 189 190 197 200 202 203 204 205 206 207 208 212 214 219 223 224 225 226 228 230 233 234 239 240 242 243 244 245 248 249

144. 2 4 5 7 8 10 11 15 16 17 18 21 23 25 27 28 29 30 31 32 35 40 43 46 48 49 50 54 55 56 57 58 60 61 62 64 65 69 70 76 79 80 83 84 88 90 96 102 107 110 111 112 113 114 117 118 120 122 124 125 127 129 131 132 133 134 136 138 142 147 148 149 151 152 153 154 155 156 157 158 160 163 165 166 167 168 170 175 176 178 179 180 183 185 186 187 190 195 196 199 200 202 203 204 206 207 208 210 212 213 214 216 219 221 222 223 224 228 229 230 234 236 238 242 245 250

145. 3 4 5 7 9 13 15 16 20 21 23 24 25 28 30 31 32 34 35 36 37 38 39 41 44 45 46 50 53 56 58 60 63 66 67 69 74 75 77 78 79 80 81 82 83 84 85 87 88 89 90 91 92 93 94 95 97 98 99 100 104 105 107 110 112 114 115 116 119 121 122 124 125 126 128 129 131 135 136 141 143 148 151 153 154 156 158 160 161 162 163 164 165 169 172 173 174 176 177 179 180 182 183 184 186 187 189 196 198 202 204 208 210 211 217 219 224 225 228 231 232 235 236 237 239 244 247 249

146. 1 2 6 7 8 9 13 15 16 18 22 25 26 29 31 35 36 39 40 42 43 44 46 49 50 51 54 55 56 58 63 65 67 68 73 77 78 79 80 82 83 86 87 89 90 93 99 100 102 103 109 110 113 116 120 121 126 127 131 132 133 134 135 136 137 139 143 148 151 153 156 157 159 160 161 162 172 174 178 179 181 182 190 191 192 195 196 198 201 202 204 205 206 208 209 210 212 214 216 219 220 221 225 229 236 238 239 241 243 245 248 249 250

147. 2 4 5 6 8 10 11 21 29 32 33 36 37 39 44 46 47 48 49 51 54 55 57 59 60 62 64 66 71 78 80 84 86 87 88 92 93 94 97 98 99 100 101 103 104 105 107 108 110 111 113 114 120 121 122 123 125 126 129 130 131 132 139 140 144 152 154 155 158 162 163 166 168 172 173 176 177 178 181 183 184 191 192 194 196 197 198 199 200 203 204 205 206 209 211 212 214 220 221 223 226 230 232 233 235 236 242 243 245 247 249

148. 2 3 4 7 10 11 12 13 14 15 16 19 20 23 27 28 30 32 33 36 37

40 43 48 51 53 58 61 62 64 66 67 69 71 72 73 74 75 76 80 81 82 83 85 86 91 92 94 99 100 101 102 103 104 105 106 107 108 110 111 112 113 114 115 116 117 120 123 127 129 132 134 136 137 138 139 140 142 144 145 146 150 151 154 157 159 164 166 167 168 170 176 178 179 181 184 186 187 190 192 195 201 202 203 205 206 207 208 209 210 211 212 215 216 217 220 224 227 230 233 234 235 238 242 244 245 247 248 249

149. 1 2 6 10 11 12 13 18 19 20 22 24 26 27 29 36 40 42 47 48 52 57 58 60 61 63 65 66 68 72 73 75 76 77 78 80 81 85 88 89 93 95 99 100 102 104 107 108 109 111 113 115 118 120 121 123 125 127 130 131 132 136 137 138 141 143 144 150 155 159 161 163 164 165 166 169 172 178 181 182 183 184 188 190 191 193 194 195 197 199 201 202 205 207 208 210 214 215 216 217 218 221 224 225 226 227 228 229 231 235 239 242 245 248 249 250

150. 1 2 6 7 8 9 13 15 16 17 20 23 24 25 26 28 31 32 41 44 47 48 53 55 56 59 64 65 66 67 71 73 76 78 80 82 83 84 85 86 89 90 94 95 96 97 98 99 104 106 108 109 111 112 115 116 117 119 120 122 123 124 127 129 135 136 139 141 142 148 149 151 152 154 156 166 170 172 173 174 175 177 179 180 182 188 189 190 191 194 200 201 204 205 207 210 214 216 217 218 219 220 221 222 223 224 227 229 230 234 235 237 238 245 246 247 249

151. 2 3 5 6 8 10 11 12 14 15 18 19 20 22 23 24 25 26 27 31 37 41 42 45 47 51 56 57 59 62 65 66 68 70 73 74 76 82 84 85 86 87 90 91 95 96 99 101 102 103 104 106 107 108 109 110 111 113 114 116 120 122 123 125 128 135 136 137 138 139 144 145 146 148 150 153 156 157 161 165 166 168 169 170 171 173 174 176 178 179 180 182 183 184 186 188 189 190 191 194 196 197 201 203 205 206 209 210 212 215 216 220 221 222 228 229 231 232 234 235 236 237 238 239 245 250

152. 1 2 5 7 11 12 15 16 20 21 23 26 27 29 30 31 32 33 37 38 41 42 44 48 50 51 53 55 59 60 61 62 63 66 68 69 70 73 74 75 76 77 78 80 81 82 83 84 86 90 93 97 98 102 103 107 109 110 111 112 113 115 116 122 126 129 130 132 133 137 139 140 141 143 144 147 150 153 154 155 156 157 160 161 165 168 169 171 173 174 175 176 177 178 179 180 181 182 184 185 187 189 190 192 195 196 200 201 202 204 205 206 207 208 211 212 213 216 217 221 223 225 226 227 228 229 230 232 237 239 241 243 245 246 247 250

153. 2 3 5 6 7 8 14 15 16 20 21 22 23 24 28 30 32 33 39 41 43 48 49 52 59 60 61 62 65 66 67 70 71 74 78 79 80 81 82 83 84 85 86 88 89 91 95 99 100 102 103 105 106 107 109 116 123 124 125 128 129 130 138 139 144 145 146 151 152 155 156 158 159 161 163 164 166 167 169 172 173 175 177 178 180 182 183 185 187 188 190 191

192 193 194 195 196 198 199 200 201 204 205 206 207 209 211 213 214 220 222 223 224 229 230 233 238 244 246

154. 3 5 7 8 13 15 16 18 20 22 23 28 29 32 38 39 40 41 42 43 44 45 47 50 51 55 58 59 62 64 65 67 75 78 85 86 87 88 89 91 92 93 94 98 99 100 101 107 108 110 111 113 114 118 119 122 128 129 130 131 132 133 134 135 137 138 139 144 145 147 148 150 152 156 157 160 161 164 165 166 167 169 172 173 174 175 177 179 180 182 183 184 185 186 187 188 189 194 196 197 198 200 203 204 205 206 207 208 209 210 213 215 219 222 223 225 226 228 237 238 239 240 243 245 246 248 249

155. 1 4 10 11 12 13 14 21 23 26 29 30 32 33 37 39 40 42 43 44 46 49 51 52 53 54 58 59 60 61 63 65 67 68 75 76 77 78 80 82 92 94 95 97 98 100 107 108 109 112 113 114 118 119 121 125 129 130 132 133 136 137 139 140 141 144 147 149 152 153 156 161 162 164 165 168 169 171 172 174 175 176 178 181 182 184 185 187 189 191 192 193 194 195 196 197 198 199 200 202 203 207 208 210 212 214 216 219 221 222 225 227 228 229 234 235 240 242 246

156. 3 6 14 16 19 24 25 28 29 31 32 33 35 36 37 39 43 50 52 53 54 56 57 58 59 60 61 63 64 65 66 67 69 72 74 77 79 83 86 87 89 93 95 97 98 99 102 103 104 106 108 112 114 116 118 119 124 125 127 128 129 133 135 136 137 138 140 141 142 144 145 146 150 151 152 153 154 155 157 158 160 162 167 169 170 171 172 173 175 176 183 185 186 188 190 192 193 195 197 201 202 204 206 207 208 209 210 211 212 213 214 219 221 223 224 225 226 229 231 232 236 240 246 248

157. 2 3 6 7 8 9 11 15 16 19 21 22 23 24 30 33 34 35 36 39 41 42 47 48 50 51 52 59 60 63 64 66 70 71 72 73 74 75 76 78 79 80 81 82 83 84 88 90 91 93 94 99 100 102 104 106 108 110 113 115 116 118 120 123 124 126 127 129 130 133 137 138 139 140 141 144 146 148 151 152 154 156 158 159 160 162 164 165 168 171 175 177 180 181 183 185 187 188 189 191 195 196 198 199 200 202 205 207 209 210 211 212 213 214 216 217 219 220 221 224 230 231 232 233 234 239 240 243 244 245 246 247

158. 1 2 3 4 5 6 10 13 14 18 20 21 22 23 25 26 28 29 31 34 35 37 41 43 48 50 52 53 56 57 58 59 60 63 64 65 68 70 71 72 73 75 76 77 78 79 84 85 91 92 93 100 102 103 107 111 112 113 124 131 134 136 139 141 142 144 145 147 153 156 157 160 165 167 168 171 172 173 175 177 179 180 183 184 186 188 189 190 192 193 196 199 200 204 205 206 208 211 212 213 215 218 222 223 225 229 232 233 235 240 241 246 248

159. 1 3 4 5 7 8 9 12 13 14 15 18 21 23 25 26 28 31 32 33 34 35 36 38 39 40 44 45 47 49 52 55 57 59 60 61 62 63 65 67 69 71 75 77

79 80 81 83 84 85 86 89 94 100 101 104 106 108 109 110 112 115 117 118 119 121 122 125 126 127 131 133 135 136 137 141 142 146 148 149 153 157 160 162 163 164 167 168 170 174 176 177 179 180 181 183 185 186 187 188 189 193 194 196 197 199 200 201 202 203 209 211 214 216 217 218 219 220 222 223 224 225 226 228 229 231 233 234 238 243 244 245 247 248 249

160. 1 2 3 4 5 6 10 14 16 17 18 19 21 22 24 26 27 29 31 36 39 41 42 43 44 46 47 48 50 51 52 53 54 56 58 59 60 62 63 65 68 69 72 73 75 79 82 85 86 87 89 91 92 96 97 100 101 105 109 112 117 119 120 122 126 130 132 135 137 138 139 141 142 143 144 145 146 152 154 156 157 158 159 162 163 164 165 166 167 168 169 170 172 179 180 182 183 184 186 188 191 192 194 197 198 199 200 202 204 206 208 209 210 212 213 215 218 219 223 227 228 229 231 232 233 235 236 238 239 243 245 246 248

161. 2 5 8 10 12 14 19 20 21 24 25 27 28 29 34 35 37 38 42 45 52 57 59 60 65 66 68 72 74 76 77 78 81 82 85 92 93 95 99 100 103 104 105 107 111 112 114 115 117 118 119 121 122 123 127 129 130 132 137 138 139 143 145 146 149 151 152 153 154 155 162 163 170 173 175 178 181 186 187 189 191 193 198 200 202 203 205 207 211 212 213 216 218 219 222 223 224 229 230 234 235 236 238 239 240 243 244 245 246 247 248 249

162. 1 2 3 4 11 14 15 16 25 26 32 33 34 38 40 42 44 46 47 48 53 55 57 59 60 61 65 68 70 71 73 74 76 77 79 80 81 84 87 89 90 93 95 96 97 99 102 105 106 108 109 110 111 114 124 126 128 129 130 132 133 135 136 138 139 142 145 146 147 155 156 157 159 160 161 164 169 172 173 174 175 178 180 185 186 188 189 194 195 196 198 199 200 202 203 204 206 207 214 215 217 218 220 223 224 225 227 229 230 231 234 238 239 241 242 246 248 250

163. 2 4 6 9 10 13 14 15 16 18 19 27 28 31 38 44 47 48 49 53 54 55 58 59 60 66 70 71 74 76 77 78 80 81 82 83 84 88 92 95 96 97 100 101 102 103 104 106 107 109 113 115 118 121 124 125 127 128 129 133 137 139 141 144 145 147 149 153 159 160 161 165 167 169 170 171 172 175 178 180 183 187 190 192 193 196 198 199 200 201 203 204 205 206 208 209 210 211 213 218 221 226 227 228 230 233 234 235 236 238 240 242 243 244 246 247 248 249 250

164. 3 5 6 7 8 10 11 12 13 15 16 17 19 21 26 27 28 29 32 34 35 38 39 40 41 42 44 45 47 49 52 53 54 56 58 60 64 67 68 70 72 74 77 78 79 83 89 90 94 96 97 100 102 104 107 109 110 112 114 116 118 122 123 124 125 126 128 129 132 133 134 137 139 141 143 145 148 149 153 154 155 157 159 160 162 165 166 172 176 183 187 188 191 192 193 194 197 199 205 206 208 211 214 215 218 219 221 226 232 234 235 236 237 240 241 242 244 247 249

165. 2 3 5 7 12 14 15 16 19 20 21 23 24 27 33 34 35 36 37 38 40 41 45 48 49 53 55 56 60 62 63 65 68 69 73 75 77 80 84 85 88 89 90 91 95 101 102 103 106 107 109 110 113 120 122 124 125 126 127 129 130 131 133 134 135 137 138 139 140 141 142 143 144 145 149 151 152 154 155 157 158 160 163 164 166 171 172 173 174 178 179 182 183 184 186 188 189 191 192 193 194 197 198 199 200 201 204 205 207 208 210 212 213 216 218 226 228 229 231 232 233 234 235 238 242 245 246 247 248 249 250

166. 1 2 3 4 5 6 7 8 10 12 16 18 19 23 24 25 26 27 29 30 33 35 36 37 40 42 43 44 47 49 51 56 57 61 62 63 69 71 73 74 76 79 82 83 87 88 89 90 92 94 96 99 103 104 108 109 112 114 115 116 118 120 122 123 135 138 139 140 143 144 147 148 149 150 151 153 154 160 164 165 167 169 171 172 173 175 178 179 181 185 186 187 191 194 197 198 199 200 203 205 209 214 215 216 217 218 220 221 222 223 226 227 229 236 238 239 243 244 245 248 250

167. 2 4 5 6 7 14 16 17 18 19 20 23 24 26 28 29 30 31 32 33 37 38 40 41 42 43 44 47 50 51 54 55 56 57 61 62 64 68 74 75 76 83 86 89 90 95 96 97 102 103 104 105 106 112 113 114 116 117 118 120 124 129 132 134 136 137 138 139 140 141 142 144 148 153 154 156 158 159 160 163 166 168 170 172 173 175 176 177 178 180 182 184 186 189 190 192 193 194 196 198 200 203 204 212 213 216 217 218 219 220 221 222 225 226 232 233 234 236 237 240 245 246 247 248 249 250

168. 2 4 5 6 12 13 14 17 22 24 25 26 27 28 33 36 38 39 40 41 42 49 53 56 57 58 61 63 66 72 74 75 76 77 78 80 81 82 84 85 86 88 94 95 96 97 98 100 101 102 107 110 111 112 114 115 118 122 123 124 127 129 130 131 132 133 135 144 147 148 151 152 155 157 158 159 160 167 171 172 173 174 176 177 178 179 181 184 186 190 192 197 198 199 200 202 206 208 209 210 211 213 217 218 219 220 222 223 228 230 231 238 239 240 244 245

169. 1 5 6 7 9 10 11 12 13 14 16 17 18 19 20 21 25 26 28 37 42 44 46 47 49 51 55 57 58 63 64 67 69 72 73 76 82 83 86 89 92 94 96 97 103 105 114 115 116 118 119 122 123 125 126 127 129 130 131 133 134 136 138 141 143 145 149 151 152 153 154 155 156 160 162 163 166 170 171 173 174 175 176 179 181 184 189 191 192 193 195 196 197 198 201 203 205 206 209 210 213 215 218 219 224 225 226 227 228 229 231 232 233 236 237 239 241 242 243 248 249 250

170. 1 2 3 4 5 6 7 9 11 13 16 17 19 20 22 24 31 33 34 35 36 38 39 40 42 45 46 47 49 51 53 61 67 70 72 74 75 76 77 78 82 83 86 88 89 91 92 93 96 100 104 105 107 108 111 112 115 116 118 123 125 126 127 128 129 132 136 138 139 140 142 144 148 150 151 156 159 160 161 163 167 169 171 173 174 175 178 180 181 182 184 189 190

191 192 193 195 197 199 203 205 206 207 208 211 213 214 215 217 218 219 220 223 225 227 231 232 233 235 237 239 241 244 245 247 248 249

171. 1 2 3 6 7 8 10 11 12 14 15 16 17 19 20 21 23 29 36 37 39 40 42 44 45 51 52 54 56 57 63 65 68 69 71 72 75 79 80 81 82 84 85 87 89 92 93 97 101 102 103 104 105 107 108 110 111 113 118 120 121 122 123 124 125 127 135 137 141 142 151 152 155 156 157 158 163 165 166 168 169 170 175 177 180 183 184 185 186 188 189 190 191 193 196 197 199 201 202 205 208 210 215 220 221 222 223 225 227 229 235 238 240 241 242 243 244 245 246 247 250

172. 1 5 6 7 8 10 12 15 16 17 19 20 21 23 25 26 27 28 29 30 31 34 36 38 39 40 41 43 44 46 48 49 53 54 55 57 58 59 61 63 66 67 68 69 70 74 77 78 81 82 83 84 86 88 89 91 93 94 96 97 98 100 103 105 106 108 109 110 112 114 116 118 120 122 124 125 126 130 133 134 137 143 145 146 147 149 150 153 154 155 156 158 160 162 163 164 165 166 167 168 173 175 177 178 179 180 181 182 184 185 187 191 193 194 196 198 201 205 206 209 210 211 213 214 216 217 220 229 231 232 233 234 240 241 242 243 244 246 249

173. 1 2 3 4 8 9 10 11 12 13 16 24 26 27 29 30 32 33 35 36 37 41 45 46 48 49 50 52 55 57 59 60 61 64 65 67 68 69 70 71 72 73 74 80 82 83 84 85 87 88 89 91 92 93 95 97 99 101 102 104 105 106 110 113 115 118 120 121 122 124 125 128 130 132 133 137 138 140 141 143 145 147 150 151 152 153 154 156 158 161 162 165 166 167 168 169 170 172 175 176 177 178 183 188 189 190 191 193 194 195 196 197 199 200 201 207 209 212 213 214 216 217 218 221 222 225 226 227 228 230 232 233 234 235 236 244 247 248 250

174. 3 4 5 6 9 10 12 13 14 16 19 20 23 25 28 34 36 41 43 44 45 47 48 53 54 55 56 57 58 60 61 62 63 67 71 72 73 75 80 82 86 89 92 94 97 99 100 101 103 104 107 108 109 111 113 115 116 117 118 122 125 126 127 131 134 135 137 139 140 141 143 145 146 150 151 152 154 155 159 162 165 168 169 170 176 177 184 185 188 189 190 192 193 194 195 199 200 201 204 209 210 211 212 214 215 216 217 221 222 223 225 227 228 229 233 234 235 237 239 240 243 244 246

175. 2 3 6 12 16 17 18 19 20 28 30 32 34 36 37 39 40 42 43 46 47 48 49 53 54 55 56 58 60 61 62 63 67 74 76 77 78 79 81 82 83 84 85 87 88 89 96 97 99 102 105 107 110 111 116 118 120 123 125 128 129 135 136 139 141 142 143 144 150 152 153 154 155 156 157 158 161 162 163 166 167 169 170 171 172 173 176 177 178 179 180 184 187 189 191 195 197 198 201 203 204 205 210 212 216 217 218 219 222 224 228 230 233 234 235 237 239 240 242 246 247 250

176. 1 2 3 5 6 10 11 13 14 15 17 18 21 25 26 27 30 33 34 37 39 40 42 43 46 47 51 53 57 59 61 63 66 67 70 71 73 74 76 78 82 83 84

85 86 88 93 95 96 97 98 99 100 101 102 109 111 112 114 115 116 120 123 126 128 129 130 131 132 135 136 137 139 140 144 145 147 148 151 152 155 156 159 164 167 168 169 173 174 175 179 180 181 182 184 187 188 190 192 194 198 204 205 206 207 208 209 211 213 218 220 225 229 231 232 233 234 238 239 245 248 249 250

177. 1 2 3 4 5 9 13 18 21 22 23 25 26 29 32 33 36 38 41 46 47 49 50 51 55 57 58 61 63 64 66 67 70 73 75 79 81 85 87 89 91 93 94 96 97 98 99 103 107 108 111 112 113 115 116 119 121 122 125 126 127 129 130 131 136 138 141 142 143 145 147 150 152 153 154 157 158 159 167 168 171 172 173 174 175 179 180 181 185 186 189 190 191 193 197 200 201 204 207 209 210 212 214 216 218 222 224 225 226 227 228 229 233 234 235 237 238 239 240 241 242 243 247 249 250

178. 1 4 5 6 8 9 11 12 16 18 20 21 26 33 34 36 39 40 43 44 45 46 47 49 51 52 54 58 59 60 62 63 66 70 71 77 78 79 82 85 90 91 92 94 95 100 101 103 105 107 108 112 113 114 116 118 119 122 123 124 127 129 131 135 137 140 142 143 144 146 147 148 149 151 152 153 155 161 162 163 165 166 167 168 170 172 173 175 180 181 182 187 190 191 192 193 194 195 198 199 200 201 202 203 204 205 208 215 216 218 220 226 227 229 232 233 235 239 240 241 244 246 247 248 249

179. 1 2 4 5 6 8 12 13 14 15 17 20 21 23 24 29 30 31 33 35 36 39 40 42 43 44 46 49 52 53 55 56 58 60 62 63 65 66 68 69 71 72 75 77 80 82 83 85 86 88 89 96 97 99 100 101 102 103 104 106 107 108 110 111 115 116 117 118 119 120 121 123 125 126 130 132 133 138 144 145 146 148 150 151 152 154 158 159 160 165 166 168 169 172 175 176 177 180 183 184 185 186 188 190 194 198 200 201 203 205 206 207 208 209 210 211 212 213 214 216 219 221 224 225 227 229 233 236 242 243 244 246 247

180. 1 2 4 5 6 10 13 14 16 17 22 25 27 30 33 35 40 42 43 44 45 46 49 50 53 55 56 57 58 61 62 63 64 67 68 71 72 75 76 78 79 81 84 86 87 89 91 96 97 98 102 103 104 106 108 111 112 113 115 118 121 122 123 125 127 128 134 135 137 139 142 143 144 145 150 151 152 153 154 157 158 159 160 162 163 167 170 171 172 175 176 177 178 179 181 183 184 186 189 190 192 193 197 199 200 201 202 204 206 207 209 210 212 213 214 215 216 219 222 225 227 228 229 230 231 232 234 236 238 240 241 243 245 247 249

181. 3 4 8 10 11 12 14 17 23 26 28 30 33 34 36 39 40 43 44 45 46 47 49 51 54 56 57 59 63 64 66 68 72 77 79 82 84 85 86 88 90 94 95 99 101 102 105 108 114 115 124 125 126 127 129 130 137 139 142 146 147 148 149 152 155 157 159 161 166 168 169 170 172 176 177 178 180 182 184 186 188 189 190 191 192 193 194 195 196 199 200

201 202 203 205 207 208 209 210 211 213 216 217 221 222 223 224 226 229 231 233 236 239 240 241 248 249 250

182. 2 3 5 11 12 13 14 15 17 18 19 20 22 23 27 30 31 32 33 34 35 36 37 38 39 40 41 45 46 47 49 50 52 54 57 63 64 65 68 69 72 75 77 78 81 82 85 86 87 88 89 94 96 101 102 103 104 105 106 108 117 118 119 123 126 127 130 132 133 134 139 140 142 145 146 149 150 151 152 153 154 155 160 165 167 170 172 176 178 181 189 191 194 195 197 202 203 205 206 209 211 212 213 214 217 219 221 223 226 228 230 231 233 234 240 242 245 247 250

183. 1 3 4 5 6 7 11 16 18 21 22 23 28 29 31 32 35 36 38 41 42 44 50 53 58 60 62 63 65 70 72 73 74 75 77 79 80 84 86 88 92 99 100 101 102 104 105 106 110 112 113 114 117 118 122 124 125 126 127 128 129 131 132 136 139 142 144 145 147 149 151 153 154 156 157 158 159 160 163 164 165 171 173 179 180 185 190 191 192 193 194 195 196 197 201 205 207 209 214 221 225 229 230 231 232 233 234 237 238 240 241 245 247 248 249 250

184. 6 7 10 11 15 16 20 22 24 25 26 28 29 30 31 34 36 37 41 43 44 46 47 48 51 52 55 56 57 58 61 62 64 65 66 67 68 70 75 77 80 82 83 84 87 88 92 93 94 95 105 106 110 111 116 117 118 120 124 125 128 130 133 135 137 139 140 142 143 145 147 148 149 151 152 154 155 158 160 165 167 168 169 170 171 172 174 175 176 179 180 181 185 186 187 189 191 192 193 194 195 196 197 198 200 201 203 204 205 208 210 211 212 213 218 223 225 226 228 229 230 232 233 234 238 239 241 245 246 247 248

185. 1 2 3 4 6 8 10 12 15 17 18 22 23 24 25 29 30 31 32 33 37 39 41 43 45 46 48 50 53 57 60 61 62 65 68 69 70 71 72 76 77 79 80 81 82 83 86 90 96 97 101 103 104 106 108 109 111 113 114 115 116 117 118 119 121 123 124 125 127 130 132 133 135 136 138 139 141 142 143 144 152 153 154 155 156 157 159 162 166 171 172 174 177 179 183 184 187 189 191 194 197 198 199 201 205 207 210 212 222 225 226 227 228 230 231 233 234 237 239 244 245 246 247 248

186. 1 3 7 8 11 12 15 16 18 21 22 23 24 25 26 29 30 32 34 36 39 41 43 44 45 49 50 51 54 55 56 57 60 62 67 69 70 71 72 76 77 78 82 83 86 89 94 95 98 99 100 101 102 105 107 108 110 111 113 114 115 121 123 124 130 131 133 135 136 137 138 139 140 141 144 145 148 151 154 156 158 159 160 161 162 165 166 167 168 171 177 179 180 181 184 189 191 194 195 200 201 202 203 207 210 211 213 215 216 219 220 222 224 227 228 229 230 233 235 238 239 243 244 248 249

187. 3 4 5 6 7 9 10 11 13 15 19 20 25 26 27 29 30 31 33 37 38 40 41 43 46 47 48 49 51 52 53 56 57 58 59 62 63 64 66 70 71 74 75 76 80 83 84 88 89 92 93 95 96 97 98 100 101 102 103 106 111 112 114 116 119 120 122 123 133 134 135 136 138 140 142 144 145 148

152 153 154 155 157 159 161 163 164 166 172 175 176 178 184 185 188 189 193 194 195 200 205 207 208 210 212 213 218 225 227 229 230 231 232 233 234 235 236 240 242 246 250

188. 1 3 4 5 6 8 9 11 12 14 16 19 21 22 23 24 25 26 28 29 34 35 36 37 38 41 45 46 48 50 51 53 55 56 62 64 65 67 68 69 71 72 74 77 81 82 83 84 88 89 95 96 98 101 102 103 107 109 110 114 118 119 121 122 124 125 126 129 131 133 134 137 139 140 141 142 143 149 150 151 153 154 156 157 158 159 160 162 164 165 171 173 174 176 179 181 187 189 190 191 192 194 195 197 198 199 200 201 202 208 209 212 214 217 218 219 220 222 223 229 231 234 240 241 242 243 244 249

189. 3 5 7 8 10 12 13 15 16 18 20 25 26 27 28 29 30 33 36 41 42 45 46 49 50 52 54 55 58 60 61 62 64 66 67 68 69 71 73 75 76 77 79 80 81 86 88 90 91 94 95 97 99 100 103 106 107 109 110 112 113 114 118 119 122 123 125 126 130 131 132 133 135 136 137 138 139 140 142 143 145 150 151 152 154 155 157 158 159 161 162 165 167 169 170 171 173 174 175 177 180 181 182 184 185 186 187 188 195 196 197 198 199 201 202 203 204 205 206 207 208 209 210 214 216 217 218 220 221 225 227 229 233 235 236 238 240 241 242 243 244 247 248

190. 2 3 4 6 7 8 9 11 12 13 16 18 19 20 25 26 32 35 37 40 41 43 48 52 53 54 57 58 59 60 61 62 68 72 74 75 76 79 81 82 88 89 90 92 93 96 98 99 101 104 105 106 107 108 109 110 111 112 117 118 120 121 122 123 125 128 129 131 135 137 138 139 140 141 143 144 146 148 149 150 151 152 153 156 158 163 167 168 170 171 173 174 176 177 178 179 180 181 183 188 191 194 195 197 199 202 204 207 209 210 212 214 215 216 220 223 224 225 226 227 228 229 231 232 237 239 243 244 246 247 248 250

191. 1 3 5 6 8 12 14 16 17 19 21 22 23 24 25 27 29 30 32 34 35 36 39 40 43 45 46 47 49 51 54 58 60 61 67 69 74 75 76 77 79 81 82 84 86 88 91 92 94 96 101 104 107 108 112 114 117 118 119 121 122 123 124 127 128 129 130 131 134 136 139 140 142 146 147 149 150 151 153 155 157 160 161 164 165 166 169 170 171 172 173 175 177 178 181 182 183 184 185 186 188 190 195 197 199 200 201 204 205 206 208 210 211 213 214 215 217 218 219 221 226 227 228 229 232 233 234 241 242 243 245 247

192. 4 9 11 13 15 16 17 18 19 20 26 28 29 30 32 33 34 37 39 40 44 45 50 51 53 54 56 57 59 61 63 65 67 68 69 70 71 72 73 74 76 77 80 81 82 83 86 88 90 91 93 94 96 98 100 102 104 105 113 116 117 118 119 122 123 125 127 129 130 132 133 136 137 138 142 146 147 148 152 153 155 156 158 160 163 164 165 167 168 169 170 174 176 178 180 181 183 184 188 194 196 198 199 201 202 204 207 210 212

214 216 217 218 222 223 226 229 230 233 240 241 242 243 245 246 250

193. 1 4 5 6 7 8 9 10 13 14 15 16 19 21 24 25 27 32 33 34 35 36 37 38 39 40 43 46 47 49 50 52 54 58 59 61 62 63 64 66 67 69 71 72 73 75 77 78 79 82 84 85 91 93 99 100 101 102 104 105 106 109 110 113 114 115 116 118 119 120 121 122 123 124 126 130 131 137 138 139 141 149 153 155 156 158 159 161 163 164 165 167 169 170 171 172 173 174 177 178 180 181 183 184 187 195 196 198 201 203 209 210 211 213 214 218 219 220 221 225 226 228 229 232 233 236 238 239 240 243 245 246 249

194. 1 2 3 5 7 8 9 14 16 20 22 23 24 26 27 28 29 32 35 36 38 39 42 45 46 48 50 51 56 57 58 59 61 66 72 73 76 78 79 80 86 89 91 94 95 96 100 101 102 105 107 108 111 112 113 117 118 119 123 125 126 127 128 131 133 134 135 137 138 139 142 147 149 150 151 153 154 155 159 160 162 164 165 166 167 172 173 174 176 178 179 181 182 183 184 185 186 187 188 190 192 197 200 201 202 204 206 207 208 209 210 213 214 215 216 219 222 223 225 229 231 232 235 236 239 241

195. 3 5 6 7 8 10 13 15 17 18 19 20 21 23 26 28 29 31 32 35 37 39 40 44 45 48 51 52 53 55 56 59 60 61 62 65 67 69 70 72 73 74 78 79 86 88 91 96 97 99 101 103 107 108 110 111 116 117 119 120 121 122 127 128 130 132 134 135 136 138 142 144 146 148 149 152 153 155 156 157 162 169 170 173 174 175 178 181 182 183 184 186 187 188 189 190 191 193 198 205 208 210 211 212 213 214 215 216 217 218 219 221 223 225 227 228 233 236 238 239 242 247 248

196. 1 2 3 4 5 6 7 8 9 11 16 17 19 20 21 23 24 25 26 29 34 35 37 38 39 40 41 43 45 47 48 50 53 56 57 58 59 61 62 65 66 67 68 69 73 74 75 76 77 78 79 80 85 89 91 92 93 94 96 97 98 101 102 104 105 108 110 112 115 116 119 123 126 127 128 129 131 132 133 135 136 140 141 144 145 146 147 151 152 153 154 155 157 158 159 162 163 167 169 171 172 173 181 183 184 189 192 193 199 203 205 206 209 212 213 215 216 218 219 222 224 227 229 230 233 234 235 236 237 238 240 241 242 245 248 250

197. 1 2 3 4 5 9 10 11 13 14 17 20 21 23 24 25 30 33 34 35 36 39 40 41 43 44 45 50 52 56 57 58 59 61 66 75 79 83 86 87 88 90 92 93 94 95 96 98 101 102 103 106 107 108 110 111 112 117 120 121 122 126 127 128 136 137 138 139 143 147 149 151 154 155 156 159 160 164 165 166 168 169 170 171 173 175 177 180 182 183 184 185 188 189 190 191 194 198 200 201 204 205 206 208 210 211 212 215 218 220 224 225 228 231 232 233 234 236 237 239 240 241 242 244 249 250

198. 2 3 5 6 9 10 11 12 13 14 17 18 20 21 24 28 32 33 34 39 40

45 47 48 51 53 55 56 58 59 62 64 67 68 69 72 76 77 78 80 81 83 84 85 86 87 89 90 93 94 97 100 101 108 110 111 114 115 117 120 121 123 126 130 131 133 135 136 138 139 141 142 145 146 147 153 154 155 157 160 161 162 163 165 166 167 168 169 172 175 176 178 179 184 185 188 189 192 193 195 197 200 201 203 205 206 207 208 210 211 212 213 214 217 218 219 220 221 222 223 224 225 226 228 230 232 233 234 235 236 238 243 245 247 250

199. 1 2 3 5 9 11 13 14 15 16 17 19 22 23 24 25 26 34 36 37 39 40 42 46 48 49 50 51 54 55 56 58 61 62 65 66 67 69 74 77 79 81 82 84 85 86 87 89 90 91 92 93 94 96 98 99 101 102 103 104 109 110 113 115 117 119 121 125 126 127 128 129 130 131 132 133 134 135 136 139 142 144 147 149 153 155 157 158 159 160 162 163 164 165 166 168 170 171 173 174 178 180 181 185 188 189 190 191 192 196 200 203 206 208 210 211 212 213 214 215 218 221 222 223 226 228 229 230 231 232 233 235 237 238 239 242 244 246 250

200. 3 5 6 8 9 15 17 18 19 20 24 25 28 29 31 32 33 35 36 37 38 40 41 43 44 45 46 47 49 50 51 55 56 57 60 62 63 65 68 69 70 77 79 80 81 83 87 88 89 90 98 101 104 105 108 109 110 111 112 113 118 119 120 121 122 123 124 126 127 128 129 131 133 134 138 139 141 142 143 144 147 150 152 153 154 155 157 158 159 160 161 162 163 165 166 167 168 173 174 177 178 179 180 181 184 186 187 188 191 194 197 198 199 201 203 204 207 208 209 210 211 213 214 216 217 218 219 221 222 223 224 225 227 229 235 236 239 240 241 242 245 246 248 250

201. 1 3 4 6 9 11 12 13 15 17 23 26 29 31 32 36 37 39 41 44 45 50 51 52 56 58 61 62 63 66 68 70 71 73 75 79 81 82 86 87 88 93 95 97 98 100 101 102 104 106 108 109 110 113 118 120 121 123 124 125 129 130 131 133 136 138 139 142 146 148 149 150 151 152 153 156 159 163 165 169 171 172 173 174 175 177 178 179 180 181 183 184 185 186 188 189 191 192 193 194 197 198 200 202 206 209 212 213 215 216 217 219 220 221 226 228 229 230 231 232 243 249

202. 7 8 11 17 19 20 21 23 27 28 33 34 39 40 44 45 46 48 50 52 53 54 56 58 61 62 64 65 68 70 73 77 78 79 82 83 84 86 87 90 91 92 96 97 98 99 100 102 103 104 110 113 115 116 120 123 125 126 127 131 135 136 138 139 141 142 143 144 145 146 148 149 152 155 156 157 159 160 161 162 168 171 178 180 181 182 186 188 189 190 192 194 201 203 204 205 208 209 213 216 218 219 220 223 224 225 228 231 235 236 237 239 243 244 246 250

203. 1 2 6 7 8 14 16 19 21 24 27 32 33 34 35 37 39 40 41 42 43 44 45 46 47 49 50 51 52 53 57 58 63 65 69 72 73 84 85 87 89 91 99 100 101 102 105 106 110 112 114 116 117 118 119 120 121 122 123 124 129 132 133 134 135 136 138 142 143 144 147 148 151 154 155

159 161 162 163 166 167 169 170 175 178 179 181 182 184 186 189 193 196 198 199 200 202 204 205 206 208 209 211 215 217 220 221 222 224 225 227 229 230 231 234 236 238 240 241 243 245 246 247 249 250

204. 3 4 5 6 7 12 13 14 15 17 18 19 24 25 26 27 28 29 31 34 36 38 39 41 42 44 46 52 58 59 62 66 67 68 70 73 77 79 80 82 83 84 87 88 89 90 94 96 98 99 100 101 102 104 106 107 111 112 113 114 118 120 121 122 124 129 131 132 133 135 136 138 141 143 144 145 146 147 150 152 153 154 156 158 160 162 163 165 167 174 175 176 177 178 180 184 189 190 191 192 194 197 200 202 203 205 206 207 209 213 217 219 221 222 230 234 237 239 240 241 243 244 249

205. 1 3 5 7 8 10 11 16 18 25 26 28 29 30 34 37 40 41 42 45 46 50 53 54 56 57 58 61 63 64 69 70 72 74 75 77 78 79 80 82 83 85 86 87 88 89 90 92 94 96 98 105 106 108 109 110 111 115 116 117 121 124 125 126 130 132 133 136 137 138 141 142 143 146 147 148 149 150 151 152 153 154 157 158 161 163 164 165 166 169 170 171 172 175 176 178 179 181 182 183 184 185 187 189 191 195 196 197 198 202 203 204 208 212 215 216 217 218 221 223 224 225 226 227 230 233 234 237 238 239 243 245 246 250

206. 1 4 5 6 9 11 13 15 20 22 24 25 26 27 29 30 31 34 35 36 37 38 39 40 41 43 44 47 49 50 52 53 56 58 61 65 68 71 72 73 75 76 79 81 82 83 84 86 90 92 95 96 97 98 100 105 106 108 110 112 113 114 115 122 124 126 130 132 133 138 140 141 142 143 144 146 147 148 151 152 153 154 156 158 160 162 163 164 168 169 170 172 176 179 180 182 189 191 194 196 197 198 199 201 203 204 207 212 213 215 216 217 218 219 223 228 229 233 241 242 244 246 247 248

207. 1 2 4 10 11 12 13 16 22 24 31 32 33 34 38 39 40 42 43 44 45 46 47 49 57 60 66 70 72 73 74 75 76 77 80 82 83 85 86 90 91 93 96 98 102 103 104 105 107 108 109 111 114 125 126 127 128 131 132 134 136 138 139 140 141 142 143 144 148 149 150 152 153 154 155 156 157 161 162 165 170 173 176 177 179 180 181 183 185 186 187 189 190 192 194 198 200 204 206 209 210 212 213 214 216 217 219 220 223 224 225 233 234 235 238 241 242 243 244 245 250

208. 1 2 4 7 8 9 10 13 14 15 16 17 18 23 24 26 27 29 32 36 37 39 41 44 47 48 49 53 55 61 62 66 67 69 72 74 75 76 78 79 80 84 85 86 87 88 91 92 93 96 97 98 99 101 102 105 106 107 108 109 112 113 114 115 118 119 120 124 125 126 131 132 134 136 137 142 143 144 145 146 148 149 152 154 155 156 158 160 163 164 165 168 170 171 176 178 179 181 184 187 188 189 191 194 195 197 198 199 200 202 203 205 209 210 211 212 214 216 217 219 220 222 225 226 230 233 236 237 238 239 240 241 242 243 246 249

209. 1 2 5 10 20 21 25 26 28 29 30 31 35 37 38 39 43 45 49 51

53 54 58 61 62 65 67 69 72 76 77 78 81 90 91 92 93 94 95 96 98 99 102 105 106 113 115 116 118 119 121 123 126 128 129 130 132 133 135 136 137 140 142 146 147 148 151 153 154 156 157 159 160 163 166 168 169 172 173 174 176 177 179 180 181 182 183 188 189 190 193 194 196 200 201 202 203 204 207 208 210 211 213 214 219 221 222 225 226 227 228 230 231 232 233 236 238 242 246 247 248 250

210. 1 3 4 8 11 13 14 15 17 18 20 21 24 25 26 28 29 35 36 41 42 43 46 50 55 57 59 63 64 65 68 69 72 73 74 75 76 77 78 79 81 83 84 85 88 91 94 98 102 114 115 116 117 120 121 122 123 124 125 129 131 135 137 139 141 144 145 146 148 149 150 151 154 155 156 157 160 163 165 168 169 171 172 174 175 177 179 180 181 184 185 186 187 189 190 191 192 193 194 195 197 198 199 200 207 208 209 212 214 217 219 221 224 225 226 227 229 231 232 234 235 236 237 239 240 242 248

211. 3 4 5 6 9 14 18 19 21 22 23 24 25 27 28 31 32 34 35 38 41 42 43 44 45 46 48 50 51 52 55 58 60 61 62 64 65 67 69 70 71 74 75 78 79 80 81 84 85 86 89 90 92 94 95 99 100 104 106 107 108 110 111 115 117 118 120 121 122 123 127 128 132 138 139 142 145 147 148 152 153 156 157 158 159 161 163 164 168 170 172 174 176 179 181 182 184 186 191 193 195 197 198 199 200 203 208 209 212 216 218 219 221 222 227 228 230 233 236 238 241 243 244 245 246 248 250

212. 3 4 5 11 12 13 16 17 18 19 22 24 28 29 31 33 36 37 39 40 42 43 44 46 48 49 50 51 52 55 56 57 58 60 62 63 66 67 68 69 70 76 77 78 81 82 83 87 89 91 94 95 96 98 99 109 110 111 112 113 119 125 127 128 130 131 132 134 138 143 144 146 147 148 151 152 155 156 157 158 160 161 165 167 173 174 175 177 179 180 182 184 185 187 188 190 192 195 196 197 198 199 201 205 206 207 208 210 211 213 214 215 216 220 221 223 224 225 226 228 229 230 238 240 241 244 245 248 250

213. 1 2 3 7 8 9 10 11 13 16 17 20 21 22 23 28 29 33 38 41 42 46 47 48 49 50 51 52 56 59 60 64 69 70 72 76 77 78 79 80 81 82 83 86 87 88 89 94 95 96 97 98 102 103 104 105 107 113 116 118 119 120 121 122 124 127 132 133 134 136 137 138 139 140 144 152 153 154 156 157 158 160 161 163 165 167 168 169 170 172 173 176 179 180 181 182 184 186 187 191 193 194 195 196 198 199 200 201 202 204 206 207 209 212 214 215 216 219 220 222 223 225 226 230 231 233 236 237 238 239 240 242 243 249 250

214. 2 3 4 7 10 11 12 13 14 15 17 19 23 25 29 31 32 34 35 36 39 40 41 45 46 49 55 56 57 59 61 62 66 68 69 70 71 72 75 76 77 78 80 83 86 88 90 91 92 93 94 95 96 97 99 100 101 103 110 112 113 117 118 119 120 121 122 124 125 126 130 132 133 138 139 140 141 143

144 146 147 149 150 153 155 156 157 159 162 164 166 170 172 173 174 177 179 180 182 183 188 189 190 191 192 193 194 195 198 199 200 207 208 209 210 212 213 215 216 217 218 223 225 228 229 230 231 236 238 240 243 246 247 248 249 250

215. 1 2 3 7 11 15 16 17 18 22 28 29 31 32 35 36 37 38 40 41 42 43 46 48 49 54 55 57 60 62 66 68 70 71 72 76 77 79 80 81 90 92 93 94 95 97 98 100 102 103 105 106 107 109 114 118 120 121 122 126 127 128 132 135 136 138 142 148 149 151 154 158 160 162 164 166 169 170 171 174 178 180 186 190 191 194 195 196 197 199 201 203 205 206 212 213 214 216 217 219 221 226 229 232 238 240 242 243 244 245 247 248 249 250

216. 1 2 5 8 9 10 11 12 19 23 24 25 26 27 28 33 35 36 40 41 42 44 45 49 53 54 55 56 59 64 65 66 67 68 71 73 80 81 84 85 86 89 90 91 92 93 96 99 100 101 103 104 106 107 108 111 116 117 119 120 123 127 130 133 134 138 139 141 144 146 148 149 150 151 152 155 157 159 161 165 166 167 172 173 174 175 177 178 179 180 181 186 189 190 192 194 195 196 200 201 202 205 206 207 208 211 212 213 214 215 217 219 223 224 225 226 228 230 232 233 236 238 239 241 242 243 244 245 246 248 249

217. 1 4 5 9 13 15 16 17 18 19 21 22 23 24 26 28 29 31 34 36 37 41 44 45 47 48 49 50 53 58 59 61 62 63 67 68 69 70 71 73 74 76 77 79 80 81 83 90 92 93 94 98 101 102 103 104 105 109 110 111 113 114 115 117 118 120 124 125 128 129 130 131 132 133 134 136 137 138 140 141 145 148 149 150 152 157 159 162 166 167 168 170 172 173 174 175 181 182 188 189 191 192 195 198 200 201 203 204 205 206 207 208 210 214 215 216 220 223 224 225 228 229 233 235 236 240 241 243 244 245 249

218. 2 3 4 7 10 11 12 14 15 16 17 20 22 23 25 26 27 28 31 34 36 38 39 40 43 44 46 48 52 56 58 60 62 63 65 68 72 73 75 78 81 83 86 88 89 91 93 94 95 96 97 98 99 100 103 104 109 112 115 118 120 121 122 125 126 131 134 138 141 142 149 150 158 159 160 161 162 163 164 165 166 167 168 169 170 173 175 176 177 178 184 187 188 189 191 192 193 195 196 197 198 199 200 202 205 206 211 214 220 225 227 230 231 232 235 236 240 241 242 246

219. 1 2 3 4 5 6 12 16 17 18 19 20 21 22 23 24 26 28 29 31 35 38 40 42 44 46 49 52 55 58 59 60 61 62 63 67 68 70 73 74 75 76 78 79 80 82 85 86 87 91 92 94 95 97 98 99 100 102 108 110 112 113 114 115 122 123 126 127 130 132 135 138 139 140 141 143 144 145 146 150 154 155 156 157 159 160 161 164 167 168 169 170 175 179 180 182 186 188 191 193 194 195 196 198 200 201 202 204 206 207 208 209 210 211 213 215 216 220 221 222 225 227 230 232 234 236 238 243 249 250

220. 1 2 3 4 5 6 7 8 11 13 17 18 20 21 23 28 29 31 33 34 35 37
38 39 41 43 46 47 48 49 50 51 52 53 55 58 60 62 63 65 66 67 71 74
75 77 79 80 85 87 92 94 95 99 107 108 109 110 111 112 113 114 117
118 119 120 121 122 123 125 127 129 130 132 134 135 137 138 141
142 146 147 148 150 151 153 157 159 162 166 167 168 170 171 172
176 178 186 188 189 190 193 197 198 201 202 203 207 208 212 213
217 218 219 221 222 226 227 228 230 231 235 238 241 243 244 245
248 249

221. 1 2 3 4 9 11 13 14 16 17 18 23 24 26 29 30 31 33 34 35 36
38 39 41 45 49 51 53 55 57 61 64 68 69 70 71 73 75 76 77 78 82 84
86 88 89 91 92 97 99 100 101 103 106 111 113 114 116 119 121 123
126 130 134 135 136 139 140 141 144 146 147 149 150 151 152 155
156 157 163 164 166 167 171 173 174 179 181 182 183 189 191 193
195 198 199 200 201 203 204 205 209 210 211 212 215 219 220 222
225 228 229 233 235 236 237 238 241 245 246 247

222. 1 6 7 10 15 16 19 20 21 23 25 27 28 29 30 31 35 36 37 39
40 41 44 46 47 51 52 53 54 57 58 59 61 62 64 65 69 70 71 73 76 77
78 81 82 83 86 87 88 90 91 93 94 95 103 106 107 108 111 112 113
115 119 120 122 123 126 128 129 131 137 138 142 144 150 151 153
154 155 158 159 161 166 167 168 171 173 174 175 177 180 181 185
186 188 192 194 196 198 199 200 203 204 208 209 211 213 219 220
221 223 224 227 228 231 233 234 236 238 239 241 243 244 249 250

223. 1 3 6 9 12 14 15 16 19 20 22 25 29 30 31 32 35 36 37 39 42
44 45 46 48 51 54 55 56 58 59 60 62 65 66 68 70 72 74 77 78 80 81
82 85 86 91 92 93 94 96 97 98 99 100 103 104 105 109 112 119 120
121 122 123 124 125 129 132 133 136 137 140 143 144 147 150 152
153 154 156 158 159 160 161 162 166 168 170 171 174 181 182 184
188 190 192 194 195 198 199 200 202 205 206 207 212 213 214 216
217 222 224 228 229 230 231 232 233 234 235 237 240 241 243 244
246 248 249

224. 1 2 3 4 6 7 8 10 11 15 17 18 20 21 22 23 24 25 26 28 32 33
34 39 41 42 44 48 51 52 53 54 56 57 58 59 62 65 68 69 76 77 78 79
80 85 86 88 90 92 93 95 96 98 100 101 105 106 108 109 111 112 115
116 117 122 123 125 127 128 129 130 133 134 135 136 139 140 142
143 144 145 148 149 150 153 156 157 159 161 162 169 175 177 179
181 186 190 196 197 198 200 202 203 205 207 210 212 216 217 222
223 226 227 230 232 233 234 235 238 239 240 241 244 245 246 247
248 249 250

225. 2 3 5 6 7 8 10 15 16 17 18 22 23 24 26 29 31 32 33 35 38
40 41 46 47 48 49 52 55 58 60 61 62 65 71 73 75 77 79 82 83 84 87
88 89 90 91 92 94 97 99 100 101 104 106 113 114 115 117 119 121
123 124 125 127 128 132 134 138 139 142 143 145 146 149 152 154

155 156 158 159 162 167 169 170 171 173 174 176 177 179 180 183 184 185 187 189 190 193 194 195 197 198 200 202 203 205 207 208 209 210 212 213 214 216 217 218 219 221 229 230 233 234 238 239 240 241 242 243 245 246 247 249 250

226. 2 3 4 8 13 15 19 20 21 22 24 25 26 27 31 32 33 35 37 38 43 44 45 46 47 48 50 52 53 55 60 61 62 63 66 67 70 71 73 74 75 78 80 81 82 83 84 89 90 91 92 94 96 101 105 109 114 115 122 125 127 129 131 133 134 135 136 142 143 147 149 152 154 156 159 163 164 165 166 167 169 173 177 178 181 182 184 185 190 191 192 193 198 199 201 205 208 209 210 212 213 215 216 220 224 228 232 233 235 238 239 240 242 250

227. 5 7 9 10 13 15 16 18 25 27 28 29 30 33 35 38 44 46 47 48 49 50 53 55 58 59 60 61 62 64 66 67 70 72 74 75 77 78 84 87 91 94 95 96 97 99 102 103 107 111 118 120 125 126 127 130 131 134 135 137 138 139 140 141 148 149 150 152 155 160 162 163 166 169 170 171 173 174 177 178 179 180 185 186 187 189 190 191 195 196 200 203 205 209 210 211 218 219 220 222 224 229 233 235 236 237 238 240 241 242 243 246 247 249 250

228. 2 4 6 7 11 16 18 19 20 22 23 25 26 28 30 31 33 34 36 37 38 39 40 45 46 48 49 50 51 52 55 58 59 61 63 64 66 67 68 70 75 76 78 83 84 85 87 93 94 95 96 97 98 99 100 106 107 110 112 113 114 118 121 123 125 126 128 129 132 137 140 141 142 143 144 145 149 151 152 154 155 159 160 163 165 168 169 173 174 175 177 180 182 184 185 186 190 191 193 195 197 198 199 201 202 206 209 211 212 214 216 217 220 221 222 223 226 230 231 232 236 238 239 241 245 246 248

229. 3 4 8 9 10 12 13 14 17 19 20 22 27 31 34 35 38 40 42 44 45 53 57 59 63 64 65 66 67 70 71 74 77 80 81 83 85 86 87 88 89 91 93 95 97 98 99 101 104 106 110 111 112 116 117 118 121 122 124 127 128 133 134 137 140 144 146 149 150 151 152 153 155 156 158 159 160 161 162 165 166 169 171 172 174 176 177 178 179 180 181 183 184 186 187 188 189 190 191 192 193 194 196 199 200 201 203 206 210 212 214 215 217 221 223 225 227 230 233 234 236 237 241 242 243 244 248 249

230. 3 5 6 7 8 14 15 16 18 19 20 21 22 23 25 26 27 28 32 34 37 41 42 44 45 46 47 49 50 51 52 53 56 57 58 60 61 65 66 67 68 71 72 75 77 78 80 84 86 89 91 92 93 94 95 96 99 100 101 103 104 106 107 108 110 111 112 113 118 119 120 124 125 128 131 133 135 136 137 140 141 142 143 144 147 148 150 152 153 157 161 162 163 168 173 175 180 182 183 184 185 186 187 192 196 198 199 201 203 204 205 208 209 211 212 213 214 216 218 219 220 223 224 225 228 229 231 233 235 236 237 238 240 241 243 245 246 247

231. 2 3 8 11 16 17 19 22 23 24 27 30 36 37 38 39 43 44 47 48 49 50 51 54 57 58 60 62 63 65 66 68 72 73 75 76 77 78 79 80 82 83 84 87 88 90 93 95 97 98 99 100 101 102 109 110 114 115 116 118 119 121 122 123 128 130 131 137 141 145 149 151 156 157 159 160 162 165 168 169 170 172 176 180 181 182 183 185 187 188 190 194 197 199 201 202 203 209 210 213 214 218 220 222 223 228 230 232 236 238 239 241 243 244 245 246 247 250

232. 1 2 12 13 14 15 19 20 22 23 24 25 26 27 29 32 35 36 43 44 46 47 51 52 53 58 60 64 65 66 69 70 72 74 75 76 77 79 81 83 84 86 87 88 89 90 92 94 95 99 100 102 103 104 105 107 110 111 114 115 117 119 127 129 131 132 134 135 139 141 145 147 151 152 156 157 158 160 164 165 167 169 170 172 173 176 178 180 183 184 187 190 191 193 194 197 198 199 201 209 210 215 216 218 219 223 224 226 228 231 235 236 238 239 240 241 242 244 245 249

233. 1 3 12 13 16 17 19 21 22 23 27 28 30 32 35 36 38 40 44 45 46 47 50 51 55 56 58 60 66 68 70 71 76 77 78 79 81 82 86 91 92 94 99 101 103 106 107 108 109 110 111 112 116 118 119 122 123 124 126 127 129 130 132 133 135 136 137 138 141 143 147 148 153 157 158 159 160 163 165 167 169 170 172 173 174 175 176 177 178 179 181 182 183 184 185 186 187 189 191 192 193 195 196 197 198 199 205 206 207 208 209 211 213 216 217 221 222 223 224 225 226 227 229 230 236 238 239 240 241 245 248 249 250

234. 4 6 8 10 14 18 19 20 26 28 30 32 33 35 38 42 43 44 45 47 48 50 51 54 55 62 65 68 69 71 72 73 75 76 78 79 80 82 84 86 87 88 89 90 91 93 94 95 98 99 102 103 104 107 111 113 115 117 118 122 123 125 127 132 134 136 140 141 142 143 144 148 150 151 155 157 159 161 162 163 164 165 167 172 173 174 175 176 177 180 182 183 184 185 187 188 191 196 197 198 203 204 205 207 210 219 222 223 224 225 229 236 240 242 245 246

235. 2 7 8 10 13 15 18 19 21 23 24 27 28 31 34 35 39 42 44 45 46 47 49 50 51 52 55 57 59 61 62 63 64 69 71 72 74 76 79 80 82 83 85 87 89 90 96 97 101 103 104 105 109 110 111 114 116 117 118 121 122 125 130 131 132 133 134 135 136 137 138 140 142 145 147 148 149 150 151 155 158 160 161 163 164 165 170 171 173 174 175 177 178 186 187 189 194 196 198 199 200 202 207 210 217 218 220 221 223 224 226 227 230 232 237 238 239 240 241 245 246 247 248

236. 2 4 5 6 9 10 12 13 14 19 20 22 24 27 29 30 32 34 36 39 40 45 46 47 48 49 50 51 52 54 56 57 59 60 62 66 67 68 71 72 73 74 75 76 77 78 79 81 82 83 84 87 89 91 92 94 103 104 111 114 117 118 125 127 128 129 130 133 135 136 139 144 145 146 147 151 156 160 161 163 164 166 167 169 173 179 180 181 187 189 193 194 195 196 197 198 200 202 203 208 209 210 211 213 214 216 217 218 219 221

222 227 228 229 230 231 232 233 234 237 239 240 241 242 243 245 249

237. 2 5 10 12 16 17 18 20 22 23 28 30 34 35 36 37 39 40 43 44 45 46 47 48 51 53 54 55 56 57 58 69 72 73 74 75 77 78 79 80 81 82 83 85 86 88 89 91 94 95 98 100 101 103 107 109 111 112 113 115 116 117 118 119 120 121 126 129 132 133 134 140 145 150 151 152 154 164 167 169 170 174 175 177 183 185 190 196 197 199 202 204 205 208 210 213 221 223 227 229 230 235 236 240 243 244 245 247 248

238. 3 6 9 11 13 14 17 19 20 21 22 24 25 26 28 30 31 32 35 36 37 42 43 47 51 52 53 56 58 59 61 63 66 68 69 70 74 77 78 80 83 84 86 87 88 89 91 94 95 97 99 100 101 103 104 105 108 109 115 116 117 119 121 124 126 127 128 129 131 132 134 135 136 137 139 140 141 142 144 146 148 150 151 153 154 159 160 161 162 163 165 166 168 171 176 177 180 183 184 186 189 193 195 196 198 199 203 205 207 208 209 211 212 213 214 215 216 219 220 221 222 224 225 226 227 228 230 231 232 233 235 240 242 244 245 248 249 250

239. 2 5 9 10 13 16 17 21 23 26 27 31 32 33 34 38 39 40 41 42 44 47 48 52 54 57 59 61 62 65 66 68 69 71 77 78 79 81 82 83 84 86 87 88 90 97 98 99 101 102 103 105 107 111 112 113 114 115 119 121 122 123 124 126 128 130 131 137 143 145 146 149 151 152 154 157 160 161 162 166 168 169 170 174 175 176 177 178 181 184 185 186 190 193 194 195 197 199 200 202 204 205 208 210 213 216 222 224 225 226 228 231 232 233 235 236 240 241 242 243 246 247 250

240. 1 7 9 12 13 16 19 20 24 25 28 31 33 36 37 43 44 47 49 50 52 53 56 64 69 70 71 73 75 76 77 80 83 84 86 89 90 93 99 100 102 103 104 105 110 111 114 115 116 117 119 120 121 122 125 126 128 130 131 133 134 136 139 141 142 143 154 155 156 157 158 161 163 164 167 168 171 172 174 175 177 178 180 181 182 183 187 188 189 192 193 196 197 200 203 204 208 210 212 213 214 215 217 218 223 224 225 226 227 230 232 233 234 235 236 237 238 239 248 249

241. 3 4 13 14 16 19 20 21 25 27 28 30 33 34 45 49 50 54 57 60 61 62 65 66 67 68 70 72 76 78 79 82 85 88 90 91 92 93 94 95 100 101 103 105 107 108 111 112 114 115 116 117 122 123 125 130 131 134 135 137 138 146 152 158 162 164 169 170 171 172 177 178 180 181 183 184 188 189 191 192 194 196 197 200 203 204 206 207 208 211 212 216 217 218 220 221 222 223 224 225 227 228 229 230 231 232 233 235 236 239 242 243 244 245 248

242. 3 5 10 12 13 14 15 19 20 21 26 28 29 31 33 34 43 45 46 51 53 54 55 57 59 61 65 66 68 69 70 71 73 78 80 83 84 86 87 88 89 91 92 95 96 99 102 104 106 107 109 110 111 113 115 118 119 120 121 123 124 125 128 132 135 136 137 138 139 140 141 142 143 144 147

148 149 155 162 163 164 165 169 171 172 175 177 179 182 187 188 189 191 192 195 196 197 199 200 206 207 208 209 210 213 215 216 218 225 226 227 229 232 234 236 238 239 241 243 246 248 250

243. 3 8 11 12 13 15 18 19 21 24 27 30 32 34 37 38 39 41 43 45 48 52 57 58 60 63 64 65 66 69 70 72 75 76 77 78 80 82 84 87 88 89 91 92 93 97 98 99 100 101 104 106 107 109 111 113 114 116 118 119 120 121 122 124 125 126 128 130 133 134 135 138 139 141 142 143 146 147 152 154 157 159 160 161 163 166 169 171 172 174 177 179 180 186 188 189 190 191 192 193 198 201 202 203 204 205 207 208 211 213 214 215 216 217 219 220 222 223 225 227 229 230 231 236 237 239 241 242 245 246 248 249

244. 2 4 8 12 14 16 19 20 21 23 28 29 32 34 35 36 37 39 40 44 45 49 50 52 53 55 56 57 59 60 66 67 68 71 72 74 76 78 81 82 83 84 85 86 88 89 97 100 102 105 107 108 109 111 113 115 117 119 120 122 123 125 126 127 130 132 135 136 138 139 142 143 145 148 153 157 159 161 163 164 166 168 170 171 172 173 174 178 179 185 186 188 189 190 197 199 202 204 206 207 211 212 215 216 217 220 222 223 224 229 231 232 237 238 241 247 250

245. 2 4 5 7 8 10 13 16 18 19 21 23 24 28 30 31 33 36 37 38 39 42 44 45 49 51 52 53 55 56 59 60 62 63 64 66 67 70 72 74 75 78 79 80 81 82 84 85 87 88 89 93 94 95 101 103 104 107 109 111 112 117 118 119 121 123 124 126 128 130 132 133 138 140 142 143 144 146 147 148 149 150 151 152 154 157 159 160 161 165 166 167 168 170 171 176 180 182 183 184 185 191 192 193 196 198 200 203 205 207 211 212 215 216 217 220 221 224 225 228 230 231 232 233 234 235 236 237 238 241 243 248 249

246. 1 5 10 12 14 15 16 18 19 20 23 24 25 27 28 29 30 31 32 34 39 41 42 45 48 54 55 56 61 62 64 66 67 68 69 72 75 78 79 83 88 90 96 98 101 102 104 108 111 112 114 115 116 118 120 121 122 123 124 126 130 131 136 138 140 141 150 152 153 154 155 156 157 158 160 161 162 163 165 167 171 172 174 175 178 179 184 185 187 190 192 193 199 200 202 203 205 206 208 209 211 214 216 218 221 223 224 225 227 228 230 231 234 235 239 242 243 250

247. 3 5 6 9 11 12 15 16 19 21 22 24 25 26 31 32 33 34 35 36 38 39 40 42 43 45 46 47 49 50 51 52 53 54 58 59 63 65 66 67 68 69 71 76 79 80 81 84 89 90 91 92 93 94 100 101 103 104 106 108 110 115 116 118 119 120 121 122 123 125 128 131 132 136 137 139 140 141 145 147 148 150 152 157 159 161 163 164 165 167 170 171 173 175 177 178 179 180 182 183 184 185 189 190 191 195 198 203 206 209 214 215 221 224 225 227 230 231 235 237 239 244 249

248. 1 2 3 4 6 7 8 10 11 14 15 16 17 19 20 22 24 26 28 30 31 32 34 38 39 40 44 45 46 49 50 51 52 53 54 55 58 60 67 68 72 73 74 76

77 79 80 81 82 83 84 85 86 89 95 97 104 105 107 108 109 111 112 113 116 117 120 122 123 124 127 130 131 134 135 137 141 143 146 148 149 154 156 158 159 160 161 162 163 165 166 167 169 170 173 176 178 181 183 184 185 186 189 190 195 196 200 206 209 210 211 212 214 215 216 220 223 224 228 229 233 235 237 238 240 241 242 243 245 249 250

249. 1 2 4 9 10 13 16 21 23 24 25 26 28 29 30 31 32 33 35 42 43 51 53 54 56 59 61 63 64 65 66 68 69 70 72 73 74 76 78 80 84 86 88 89 90 93 98 100 102 104 105 106 107 111 112 114 115 119 120 121 122 126 127 128 129 131 132 138 143 145 146 147 148 149 150 154 159 161 163 164 165 167 169 170 172 176 177 178 180 181 183 186 188 193 197 201 203 204 208 213 214 215 216 217 219 220 222 223 224 225 227 229 232 233 236 238 240 243 245 247 248

250. 3 10 15 18 19 20 21 28 31 33 35 37 38 41 43 44 48 50 53 54 57 62 64 66 70 71 72 73 74 77 80 82 83 84 86 87 91 92 94 95 96 98 99 100 101 102 104 105 106 107 108 109 111 112 113 116 117 118 121 122 124 130 136 137 138 141 142 144 146 149 151 152 162 163 165 166 167 169 171 173 175 176 177 181 182 183 187 190 192 196 197 198 199 200 202 203 205 207 209 211 212 213 214 215 219 222 224 225 226 227 231 233 238 239 242 244 246 248

# Appendix B

# An Exceptionally Hard Problem (EHP)

The format of the file for the EHP is as follows. The first line gives the number of variables (50), the uniform domain size (8), the density of the constraint graph (0.5) and the tightness[1] of constraints (0.06). Subsequent lines define constraints in the following way:

$$i \; j \quad \text{list-of-conflicts}$$

where list-of-conflicts is the list of tuples that are not allowed in the constraint between the variables $i$ and $j$. Obviously, if a constraint for $(i, j)$ exists, then the one for $(j, i)$ must exist by symmetry. The complete listing of the file for the EHP is as follows:

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1 25 ((1 2) (2 2) (7 7) (7 8))
1 28 ((5 5) (5 7) (7 6) (8 4))
1 34 ((1 6) (2 1) (3 2) (4 6))
1 37 ((6 1) (6 3) (8 4) (8 7))
1 41 ((2 4) (3 5) (4 3) (6 4))
1 6 ((1 2) (1 4) (4 7) (7 6))
1 9 ((1 3) (5 1) (5 5) (8 2))
1 13 ((2 3) (2 5) (3 4) (6 7))
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1 21 ((4 1) (6 5) (8 5) (8 6))
1 23 ((4 3) (4 8) (5 2) (5 7))
1 26 ((2 5) (2 8) (3 7) (4 6))
1 32 ((2 3) (2 6) (6 2) (8 1))
1 36 ((1 1) (1 2) (2 1) (6 4))
1 38 ((1 5) (2 4) (4 1) (5 7))
1 42 ((1 3) (6 3) (6 8) (7 8))
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[1] The definition of "tightness" is given in section 2.3.1.

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1 47 ((1 6) (2 7) (3 7) (8 5))
2 3 ((1 1) (4 5) (6 1) (7 3))
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2 42 ((1 4) (1 7) (4 1) (8 1))
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3 15 ((3 6) (3 7) (6 4) (8 4))
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3 43 ((1 4) (2 4) (3 7) (5 8))
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4 42 ((1 4) (4 3) (7 8) (8 1))
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