Discrete Mathematics 83 (1990) 327–330
North-Holland

FORTHCOMING PAPERS

The following papers will be published in future issues:

Wolfgang Schmidt, Greedoids and searches in directed graphs.

Let (V, D) be a directed graph and $P_0 \in V$. Define $\mathscr{F} := \{X \subseteq D : X$ is a branching rooted at $P_0\}$. Then $(D, \mathscr{F})$ is called a directed branching greedoid. Greedoids were introduced and studied in great detail by B. Korte and L. Lovász. We give a characterization of directed branching greedoids.

Michelle L. Wachs, The major index polynomial for conjugacy classes of permutations.

In [3], A. Garsia gives a remarkably simple expression for the major index enumerator for permutations of a fixed cycle type evaluated at a primitive root of unity. He asks for a direct combinatorial proof of this identity. Here we give such a combinatorial derivation.

E.J. Cockayne, O. Favaron, H. Li and G. MacGillivray, On the product of the independent domination numbers of a graph and its complement.

It is shown that the maximum value over p vertex graphs of the product of the independent domination numbers of a graph and its complement is at most $\min\{(p+3)^2/8, (p+8)^2/10.8\}$.

Shalosh B. Ekhad, A short proof of a "strange" combinatorial identity conjectured by Gosper.

Using the method of WZ-pairs [4], I give a new proof of a conjecture of Gosper (see [2]), that was recently proved and generalized in [1] and [3].

Douglas D. Grant, A generalisation of the diameter of a graph.

We prove the following theorem:

If G is a connected finite graph of order p, and S is a k-subset of $V(G)$ (where $k \geqslant 2$), then there is a pair of vertices in S which are at a distance $\leqslant 2\lfloor (p-1)/k \rfloor$ if k does not divide p, and $\leqslant 2\lfloor (p-1)/k \rfloor + 1$ otherwise.

Peter Horák, Extending partial systems of distinct representatives.

We determine a necessary and sufficient condition for a special class of families of sets to have the property that each partial SDR of cardinality d can be extended to a total SDR. This result is a generalization of a theorem of Brualdi and Csima concerning matching extension in a regular bipartite graphs.

Suk Geun Hwang, A note on the monotonicity of the permanent function.

Let Ω_n denote the set of all $n \times n$ doubly stochastic matrices and let $J_n = [1/n]_{n \times n}$. It is conjectured that, for any $S \in \Omega_n$, the permanent function is monotone increasing on the straight line segment from J_n to S, or equivalently that for any Θ, $0 \leq \Theta \leq 1$,

$$\operatorname{per}[(1-\Theta)J_n + \Theta S] \leq \operatorname{per} S \tag{1}$$

for all $S \in \Omega_n$. In this paper we show that the polynomial equation

$$\sum_{k=0}^{n} \frac{(1-x)^{n-k}(nx)^k}{k!} - \left(\frac{n}{n-1}\right)^{n-1}\left(\frac{n-2}{n-1}\right)^{n-2} = 0$$

has a unique solution α_n in the open interval $(0, 1)$ and that the inequality (1) holds for all Θ, $0 < \Theta \leq \alpha_n$ and for all $S \in \Omega_n$ with equality iff $S = J_n$.

Rahul Mukerjee and Sudhir Gupta, Geometric construction of balanced block designs with nested rows and columns.

A new series of balanced block designs with nested rows and columns is constructed using the finite Euclidian geometry. Some such designs along the line of Cheng (1986) are also considered. A result on the system of distinct representatives is seen to be helpful in the derivation.

Akira Saito, One-factors and k-factors.

Let G be a graph with a 1-factor F and of order at least four. Let k be a positive integer. If $G - \{x, y\}$ has a k-factor for each $xy \in F$, then G itself has a k-factor.

G.J.M. van Wee, On the nonexistence of certain perfect mixed codes.

It is shown that if a nontrivial perfect mixed e-code in $Q_1 \times Q_2 \times \cdots \times Q_n$ exists, where the Q_i are alphabets of size q_i, then the q_i, e and n satisfy certain divisibility conditions. In particular, all differences $q_i - q_j$ must be divisible by $e + 1$.

H.L. Abbott and M. Katchalski, Further results on snakes in powers of complete graphs.

By a snake in a finite graph G is meant a cycle without chords. Denote by $S(G)$ the length of a longest snake in G. In this paper we obtain a new lower bound for $S(G)$ in the case where G is the product of d copies of the complete graph on n vertices.

Shreeram S. Abhyankar and Sanjeevani B. Joshi, Generalized rodeletive correspondence between multitableaux and multimonomials.

In the third volume of his book on the Art of Computer Programming, Knuth has refined a sorting procedure originated by Robinson and Schensted. By employing a modification of this procedure, in this paper we show that the Straightening Law of Doubilet–Rota–Stein is not valid in the case of "higher dimensional" matrices. In greater detail: In the classical two-dimensional case, the said Law says that the standard monomials in the minors of a (rectangular) matrix X, which correspond to standard bitableaux, form a vector space basis of the polynomial ring $K[X]$ in the indeterminate entries of X over the coefficient field K. Now we may ask what happens to this when we consider "higher dimensional" matrices by using cubical, 4-way, . . . , q-way determinants which were already

introduced by Cayley in 1843. In the present paper, as a consequence of the Robinson–Schensted–Knuth correspondence, we show that, for $q > 2$, the standard monomials in the multiminors of the multimatrix X do not span the polynomial ring $K[X]$; in a forthcoming paper it will be shown that they are linearly independent over K.

A. Clivio, Tilings of a torus with rectangular boxes.

We consider tilings of a torus T_r ($= \mathbb{R}/r_1\mathbb{Z} \times \mathbb{R}/r_2\mathbb{Z}$ for a pair of positive integers r) with translated copies of finitely many rectangles whose sides have integer lengths (several copies of the same rectangle can be used); if the horizontal or the vertical sides have length 1, then such a rectangle is called a rod. We give a simple criterion for the tilability of a torus T_r with rods provided that T_r is large with respect to the rods, i.e. r_1 and r_2 are large. The proof uses a coloring argument so it also yields a necessary condition for the existence of an integer tiling. For this generalized notion of tilability we prove a result with arbitrary rectangles as tiles, namely, we present an explicit criterion for integer tilability of a torus with finitely many rectangles.

Both criteria can be formulated in every dimension.

C. Cooper, Pancyclic Hamilton cycles in random graphs.

Let $\mathscr{G}(n, p)$ denote the probability space of the set $\mathscr{G}$ of graphs $G = (V_n, E)$ with vertex set $V_n = \{1, 2, \ldots, n\}$ and edges E chosen independently with probability p from $\mathscr{E} = \{\{u, v\} : u, v \in V_n, u \neq v\}$.

A graph $G \in \mathscr{G}(n, p)$ is defined to be pancyclic if, for all s, $3 \leq s \leq n$ there is a cycle of size s on the edges of G. We show that the threshold probability $p = (\log n + \log\log n + c_n)/n$ for the property that G contains a Hamilton cycle is also the threshold probability for the existence of a 2-pancyclic Hamilton cycle, which is defined as follows. Given a Hamilton cycle H, we will say that H is k-pancyclic if for each s ($3 \leq s \leq n-1$) we can find a cycle C of length s using only the edges of H and at most k other edges.

Dino J. Lorenzini, On a finite group attached to the laplacian of a graph.

Let $F = \mathrm{diag}(\varphi_1, \ldots, \varphi_{n-1}, 0)$, $\varphi_1 \mid \cdots \mid \varphi_{n-1}$, denote the Smith normal form of the laplacian matrix associated to a connected graph G on n vertices. Let $\bar{h}$ denote the cardinal of the set $\{i \mid \varphi_i > 1\}$. We show that $\bar{h}$ is bounded by the number of independent cycles of G and we study some cases where these two integers are equal.

Peter McMullen, Regular polyhedra related to projective linear groups.

For each odd prime p, there is a regular polyhedron Π_p of type $\{3, p\}$ with $\frac{1}{2}(p^2 - 1)$ vertices whose rotation group is PSL$(2, p)$; its complete group is PSL$(2, p) \times Z_2$ or PGL$(2, p)$ as $p \equiv 1$ or $3 \pmod 4$. If $p \equiv 1 \pmod 4$, then the group of Π_p contains a central involution and identification of antipodal vertices under this involution yields another regular polyhedron $\Pi_p/2$ of type $\{3, p\}$ with $\frac{1}{4}(p^2 - 1)$ vertices and group PSL$(2, p)$. Realizations of the polyhedra in euclidean spaces are briefly described.

A. Quilliot, On the triangle families which may be oriented as cyclic orders.

A cyclic order is a family F of triples of a set X such that:

$(x, y, z) \in \vec{F} \Rightarrow (y, z, x)$ and $(z, x, y) \in \vec{F}$; (Cyclicity)

$(x, y, z) \in \vec{F} \Rightarrow (y, x, z) \notin \vec{F}$; (Antisymmetry)

(x, y, z) and $(z, t, x) \in \vec{F} \Rightarrow (y, z, t)$ and $(t, x, y) \in \vec{F}$; (Transitivity).

We deal in this paper with the following problem:

> A family F of triangles (3-subsets) of a set X being given, is it possible to orient every triangle of F in order to get a cyclic order?

Christian Schindler, Constructible hypergraphs.

The class $\mathcal{M}$ of finite manuals (i.e. hypergraphs formed by the cliques of finite graphs) is closed under the formation of sums and products. We define the class of constructible hypergraphs to be the smallest subclass of $\mathcal{M}$ which contains all finite classical manuals (i.e. hypergraphs having a single edge) and is closed under the formation of sums and products. Constructible hypergraphs have two interesting properties: (1) they do not contain hooks and (2) all their minimal transversals are supports of dispersion-free stochastic functions. Property (1) is known to characterize the constructible members of $\mathcal{M}$. In this article we show that the same holds true for property (2).

Stephen L. Snover, Charles Wavereis and John K. Williams, Rep-tiling for triangles.

In this paper we prove that one can only tile a triangle with tiles of congruent to each other and similar to the original triangle when k^2, l^2+k^2, or $3k^2$ tiles are used. The result is based on the geometry of packing and a result of I. Niven's on rational trigonometric values. In addition we describe how to tile most triangles.

Xingxing Yu, On neighbourhood line graphs.

In this paper we study relationships between neighbourhood line graphs and a certain type of design. We answer some questions posed by Neumaier [4].