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Assessing the Reliability of the B-1B Lancer Using Survival Analysis

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THESIS

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Abstract

During the 2017 posture statement to the US Senate Armed Services Committee, the Secretary of the Air Force and Chief of Staff of the Air Force stated the Air Force suffers from shrinking aircraft inventory, aging aircraft fleets, and flying beyond the expected service life. These trends are not an the exception to the B-1B Lancer, which has been in service since 1986. Recently, the B-1B Lancer has maintained the lowest mission capable (MC) rates of 47.7 percent. The purpose of this research is to explore the failure rates of the B-1B Lancer using survival analysis that investigates the failure behavior of the B-1B Lancer. A Cox proportional hazards regression model with frailty confirms the existence of unobserved heterogeneity or frailty in our analysis. When the frailty is controlled, combat missions increase in failure rates. Other variables, mainly flight hour or sortie duration related variables, are inconclusive and require further analysis. This study proposes insights based on findings and suggests future research directions.

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ASSESSING THE RELIABILITY OF THE B-1B LANCER USING SURVIVAL ANALYSIS

I. Introduction

In June 2017 the Secretary of the Air Force, Heather A. Wilson, and the Chief of Staff of the Air Force, General David L. Goldfein, presented to the United States Senate Armed Services Committee a candid state of affairs for the United States Air Force (DAF, 2017). These leaders stated that over the last quarter century, the number of aircraft in the Air Force inventory has been reduced from 8,600 aircraft to 5,500, while the operational demands for flying have increased. The Air Force of today averages procurement of 96 new aircraft per year compared to 510 aircraft prior to Operation Desert Storm in 1991. This reduction of aircraft procurement has resulted in the average age of the aircraft fleet to be more than 27 years old (DAF, 2017), with six different aircraft types over 50 years old (Everstine, 2014).

The United States Air Force has been flying combat missions without pause since 1991, with the latest missions supporting Operation Inherent Resolve to combat the Islamic State (ISIS), where 70 percent of the total coalition airstrikes having been conducted by the aircraft from the Air Force (DAF, 2017). These missions result in a very high accumulation of flying hours, requiring extensive and increased aircraft maintenance to support the high operations tempo. Currently, only 50 percent of the flying squadrons in the USAF are capable of executing all of their assigned missions (DAF, 2017). In 2014, the average mission capable rate for the Air Force fleet was 75

percent, with the lowest rate belonging to the B-1B Lancer at 47.7 percent (Everstine, 2014).

Manpower challenges are also a significant concern for senior USAF leaders. Recognizing that manpower levels were at dangerously low levels, the Fiscal Year 2018 (FY18) budget request allowed an increase in the total force (Active Duty, Air National Guard, Air Force Reserve, and civilians) from 660,707 to 669,611 personnel (DAF, 2017). Much of this increase in personel is driven by a need for more maintenance personnel to support the aging fleet, and to support new aircraft entering the Air Force fleet. The FY18 budget request includes 11.9 billion dollars specifically for weapons systems sustainment, such as aircraft part and maintenance operations (DAF, 2017). The increased age of aircraft and higher usage leads to an increased cost of maintenance sustainment (Versprille, 2016).

As a consequence of the ever-aging USAF aircraft fleet, the supply of aircraft parts is becoming less dependable as companies that supplied parts for older aircraft have gone out of business (Versprille, 2016). Although an authorized method, cannibalization of parts from decommissioned aircraft at the 309th Aerospace Maintenance and Regeneration Group has become a routine operation for some aircraft types (Griffin and Tomlinson, 2016). Keeping legacy aircraft in the Air Force inventory longer than intentionally designed results in a negative feedback loop as illustrated by General Herbert Carlisle during his speech at the Air Force Association conference in February 2016, “If we keep the older weapons systems, we’re keeping the maintainers, we’re keeping the operations and maintenance costs... We’re doing all that for the aging fleet and that money can’t be put into new weapons systems.” (Versprille, 2016). An

infamous television segment by *Fox News* on the state of flying operations in the U.S. Air Force showed an aircraft maintenance technician with a landing gear component he had removed from a decommissioned B1-B Lancer static display aircraft to install in an operational B-1B due to parts scarcity (Griffin, 2016).

The B-1B Lancer has served in the United States Air Force since 1986, where it was originally designed as a supersonic long-range nuclear strike bomber to replace the B-52 Stratofortress (B-1B fact sheet, 2015). However, with the ending of the Cold War, the mission of the B-1B changed to that of a conventional bomber, a mission it was not originally designed to perform (B-1B fact sheet, 2015). A total of 100 aircraft were delivered to the Air Force between 1986 and 1988, but today only 64 aircraft are still active (B-1B fact sheet, 2015). The B-1B has been flying combat missions continuously since its first combat mission in 1998, averaging 23,000 flight hours annually over the last ten years (Everstine, 2014).

The B-1B Lancer having such a significant combat role in flying operations over the last decade while suffering from some of the most challenging maintenance issues in the Air Force is a cause for concern. While known to be highly unreliable for availability and having high failure rates, there is no study on this which employs survival analysis that could help better understand the failure behavior of the B-1B.

By using survival analysis, this thesis will answer the following question: *What is the B-1B's survival function concerning failures and what flying variables are related to its survival function to better predict its reliability?*

The purpose of this research is to explore the failure rates of the B-1B Lancer by using survival analysis utilizing flight hours, mission types, and a number of sorties as

variables to analyze the reliability of the B-1B. This research also will compare and contrast its finding with an existing study of B-1B failure rates conducted in 2017, and it will utilize the same baseline data but under a different methodology of analysis. This research also seeks to propose a desirable framework for reliability analysis for various other aircraft and identify future research directions for other weapon systems and weapon system components.

The scope of this research is an exploratory study with a limited sample of sortie information from 17 B-1B's flying from October 2013 to November 2016. The flight and maintenance data used as the basis for this research is assumed to be accurate, and that the sample used is unbiased and representative of the entire B-1B fleet.

II. Literature Review

The search for related studies utilizing survival analysis for aircraft or weapon systems did not result in any findings. However, studies were found where survival analysis was applied to complex equipment type items and traffic safety analysis.

A 2017 study on the failure rates of various electrical machines used in the diamond mining industry was used to better identify when different machines were likely to fail, but also which subcomponents would fail as well (Shevchuk, 2017). This study utilized the Kaplan-Meier estimator in the analysis which was able to overcome the challenges of processing incomplete data from maintenance records while still ensuring accuracy with the results given (Shevchuk, 2017).

Survival analysis was also used to investigate vehicle accidents at traffic intersections in Melbourne, Australia (Bagloee and Asadi, 2016). This study used survival analysis modeling of nine years of vehicle accident data to discover effective methods for reducing vehicle accidents and increasing pedestrian safety (Bagloee and Asadi, 2016).

While not specifically using survival analysis, a study conducted in 1977 on the F-4 Phantom by Tactical Air Command sought to determine what variables, such as accumulated flying hours, number of sorties flown, and mission types were driving increased maintenance requirements and failure rates (Hunsaker et al. 1977). This study found that the length of a sortie had minimal effect on failure rates. However, the type of missions flown did have a significant impact. The number of missions flown also drove

increased maintenance requirements when compared to other aircraft which accumulated the same total hours but in a fewer total number of sorties (Hunsaker et al. 1977).

The most significant study regarding the reliability of the B1-B Lancer was a 2017 analysis that used logistic regression and the systems reliability theory to predict B-1B failure rates based on different mission types and sortie duration (Williams, 2017). This study was motivated by the researcher's own maintenance experience with the B-1B in both stateside and deployed locations where he noticed that B-1B's conducting combat missions in a deployed location had higher mission capable rates than B-1B back at home station in the United States. The author sought to determine if the longer sorties inherent with combat missions had an impact on the failure rates of the B-1B and what the relationship, if any, there was between failure rates and mission types and sortie durations (Williams, 2017).

This research analyzed B-1B operations and maintenance data for 33 B-1B aircraft from October 2013 to November 2016. The data included sortie duration length, date of the mission, the mission types flown, the aircraft break codes, and the air aborts were sorted into a master data file consisting of a total of 5,067 sorties. This master data file was then used to conduct various logistic regression analysis tests on different mission types, combat, training, and combat and training missions combined (Williams, 2017).

The findings of this study concluded that sortie duration does have an impact on failure rates. The odds of a failure occurring from a sortie decrease by 3.8 percent for every additional hour flown in that sortie. This percentage was for all mission types combined. More specifically, for all training missions, the odds of failure occurring from

a sortie decreased by 7.8 percent for each additional hour flown in that sortie. However, some training mission types had no relationship between sortie length and sortie failure probability. Combat sorties had the greatest relationship between sortie failure rates and sortie duration, with an odds of sortie failure decreasing by 12.2 percent for every additional flight hour flown per sortie (Williams, 2017).

These findings led the researcher to propose that an additional flight hour for each training sortie could save the Air Force approximately $12M per year in maintenance costs for the B-1B (Williams, 2017). The researcher did note that this would also increase fuel costs due to fuel consumption, and it would increase the rate at which aircraft would accumulate flight hours, therefore increasing the age of the airframe and accelerating timelines for flight hours driven maintenance (Williams, 2017).

The master data file used in the Williams study serves as the baseline of data for the survival analysis conducted in this thesis.

III. Methodology

There are three major approaches to survival analysis such as non-parametric, semi-parametric, and fully parametric models. This study employs non-parametric and semi-parametric models, that is, the Kaplan-Meier survival function and Cox proportional hazards regression along with descriptive statistics to perform the survival analysis on predicting B-1B failure rates. The KM survival function is defined as the product of all fractions that estimate the conditional probabilities for failure times $t_{(j-1)}$ and earlier. The Cox proportional hazard model, with fixed time covariates in scalar form, is also used where the baseline hazard function that is the function of a subject whose covariates all have the value of zero. In addition, because the function is arbitrary, there is no constant term in the model.

Cox and Oaks (1984:49) expresses the KM survival function as:

$$\widehat{\boldsymbol{S}}(t) = \prod^{t} \left(1 - \frac{d_j}{r_j}\right) \quad (1)$$

where

$\widehat{\boldsymbol{S}}(t)$ = estimator of the survival function

t = survival time

j = a time unit

d = failures

r = trials

Mills (2011:87) describes the Cox proportional hazard model with fixed-time covariates as:

$$h_i(t) = h_0(t)\{exp(\beta_1 x_{i1} + \ldots + \beta_k x_{ik})\}, \quad (2)$$

where

$h_i(t)$ = survival function

$h_0(t)$ = baseline function whose parameters are all zeros

β = regression coefficient

x = covariate

where $h_0(t)$ is the unspecified baseline hazard function. For the Cox proportional hazards model for frailty, Mills (2011:168) states the hazard rate for the *j*th individual in the *i*th subgroup as follows:

$$h(t_{ij}) = h_0(t)\{\exp(\beta' \mathbf{x}_{ij} + \ldots + \Psi' w_j)\}, \quad (3)$$

where

$h(t_{ij})$ = survival function

$h_0(t)$ = baseline function whose parameters are all zeros

β = regression coefficient

x = covariate

$\Psi' w_j$ = subgroup frailty

The subgroup frailty, w_j, is distributed with the mean 0 and variance 1. These models are solved using R version 3.3.2 (2016) with the survival package. The R commands and results are available in Appendix B.

IV. Data and Variables

The dataset for this study, which is retrieved from Williams (2017), includes 1,953 observations for 17 B-1B aircraft. This data is available in Appendix A. Failure events in the data set are recorded in days for 38 months from October 2013 to November 2016. Since the time unit is a day, the use of continuous time survival models is appropriate (Yamaguchi, 1991:16).

There are categorical and continuous variables as presented in Table 1 and Table 2. The categorical variables are Combat Mission (1 for combat missions and 0 for non-combat missions) and Failure (1 for failures).

Table 1: Descriptive Statistics for Categorical Variables

	Total Cases	Frequency	Percent
Combat Mission	1,953	901	46.1
Failure	1,953	682	34.9

Combat Mission is a dummy variable and indicates a number of sorties flown for combat orders. A total of 901 combat sorties are recorded during the observation period. Regarding the number of failures, 17 aircraft experienced 682 failure events during the period. On average, this is 40.12 failures per aircraft during the 38 months. The descriptive statistics for continuous variables are shown in Table 2.

Table 2: Descriptive Statistics for Continuous Variables

	Total Cases	Minimum	Maximum	Mean	Standard Deviation
Flight Hours per Sortie	1,953	0.5	24.1	8.232	4.189
Flight Hours (Lagged)	1,953	0.5	24.1	8.231	4.186
Flight Hours between Failures	682	0.5	340.4	23.244	34.585
Cumulative Sorties*	17	5.0	283.0	146.590	67.440

*: Total number during the observation period.

The mean for flight hours per sortie is 8.23 hours. In addition to flight hours per sortie, flight hours (lagged), which are lagged for one period, will be included in survival analysis. Flight hours between failures are included to measure the cumulative effect of flight hours on the failure of an airplane. Flight hours between failures show the highest variability among the continuous variables as its standard deviation to the mean indicates. Cumulative sorties represent the number of sorties flown per aircraft during the observation period. Instead of calendar days, cumulative sorties will be used for modeling time in survival analysis. By using cumulative sorties, the aircraft on the ground for maintenance and/or awaiting spare parts will not be counted as available or not failed. When comparing the mean for flight hours per sortie with flight hours between failures, an aircraft suffers a failure almost every three sorties. The values used to calculate the average number of sorties between failures does not factor in maintenance issues detected on the ground between sorties.

There are various factors that affect the reliability of aircraft. Mission type for military aircraft is one of these factors. Sherbrooke (1997) found that mission type was significant for predicting aircraft spares demand. Williams (2017) also identified that mission type was significant when he grouped missions into combat and training categories. Therefore:

H1: Combat missions will increase failure rates.

Pohl (1991) used flight hours in the simulation study for assessing the reliability of fighter jets. Sherbrooke found that sortie duration or flight hours per sorties affected to aircraft spares demand that was related to the failure of aircraft. Williams (2017) concluded that sortie duration was positively related to the survival function of aircraft. Therefore:

H2: Longer flight hours per sortie will increase failure rate.

Similarly, Sherbrooke (1997) argued that previous sorties were correlated with failures at the time the failures were found. Therefore:

H3: Previous flight hours (lagged flight hours) will affect failure rates.

Additionally, we assume that cumulative flight hours between failures at are related to the survival of aircraft. Therefore:

H4: Flight hours between failures will increase failure rates.

These hypotheses are tested using non-parametric and parametric survival analyses.

V. Results and Discussion

Simple summary statistics of the variables per aircraft during the observation period are presented in Table 3. Instead of the tail numbers of the 17 aircraft, numbers one (1) through 17 are assigned to them. These identification numbers (ID) are also necessary for modeling frailty in survival analysis for recurrent events such as number of failures in this study.

Table 3: Descriptive Statistics per Aircraft

ID	Failures	Total Flight Hours	Flight Hours/Failure	Combat Missions	Total Sorties
1	76	2,152.70	28.3	157	255
2	43	986.90	23.0	47	183
3	52	1,455.90	28.0	110	176
4	53	938.20	17.7	45	168
5	61	1,252.90	20.5	73	185
6	43	873.20	20.3	44	143
7	66	2,102.20	31.9	136	283
8	53	912.20	17.2	52	137
9	22	277.80	12.6	0	74
10	6	65.00	10.8	0	20
11	36	1,103.10	30.6	61	173
12	49	1,833.00	37.4	124	231
13	27	375.70	13.9	1	109
14	2	15.70	7.9	0	5
15	29	388.90	13.4	0	135
16	27	935.20	34.6	51	126
17	37	407.90	11.0	0	135
Min	2	15.70	7.9	0	5
Max	76	2,152.70	37.4	157	283
Mean	40	945.68	21.1	53	149
SD	20	660.50	9.2	52	73

As Table 3 reveals, some aircraft such as ID numbers 1, 3, 7, and 12, have flown more than others. In addition, they have carried out more combat missions or sorties. Because the B-1B Lancer has been operated in the Air Force since 1986, the aircraft with fewer flight hours, for example, ID numbers 9, 10, and 14, may be under maintenance or simply not utilized much during the 38-month period. Based on this assumption, we can conclude that some aircraft are either more or less reliable than others.

When the ratios between combat missions or sorties and total sorties during the period are compared, the reliable aircraft have flown for greater flight hours than the less reliable aircraft. For example, the reliability for aircraft 1 was 61.57 percent while the reliability for aircraft 2 was 25.57 percent. The fourth column in Table 3, mean flight hours per failure, supports this finding. This finding will therefore be used in interpreting the results of the survival analysis. This issue is related to the assumption of homogeneity of the subjects. Therefore, we will not discuss the results of hypothesis testing until we address the violation of the homogeneity assumption.

Non-parametric survival analyses, Kaplan-Meier (KM) estimators, have been applied to the data set before trying semi-parametric survival models. The mean and median along with 95 percent confidence intervals by the KM analysis are exhibited in Table 4.

Table 4: Kaplan-Meier Estimators for Survival Time

Combat Mission (1=yes)	Mean				Median			
	Estimate	Standard Error	95% Confidence Interval		Estimate	Standard Error	95% Confidence Interval	
			Lower Bound	Upper Bound			Lower Bound	Upper Bound
0	153.75	3.63	146.63	160.87	162.00	4.38	153.42	170.58
1	168.09	3.73	160.79	175.40	161.00	8.78	143.80	178.21
Overall	163.14	2.78	157.69	168.59	164.00	3.73	156.70	171.30

The 95 percent confidence intervals for combat and non-combat missions or sorties around the arithmetic mean values are slightly overlapping. The same intervals around the median values are also significantly overlapping. Therefore, it is shown that the survival functions of the aircraft are not different between combat and non-combat missions in this data set. This finding is supported by the survival functions depicted in Figure 1.

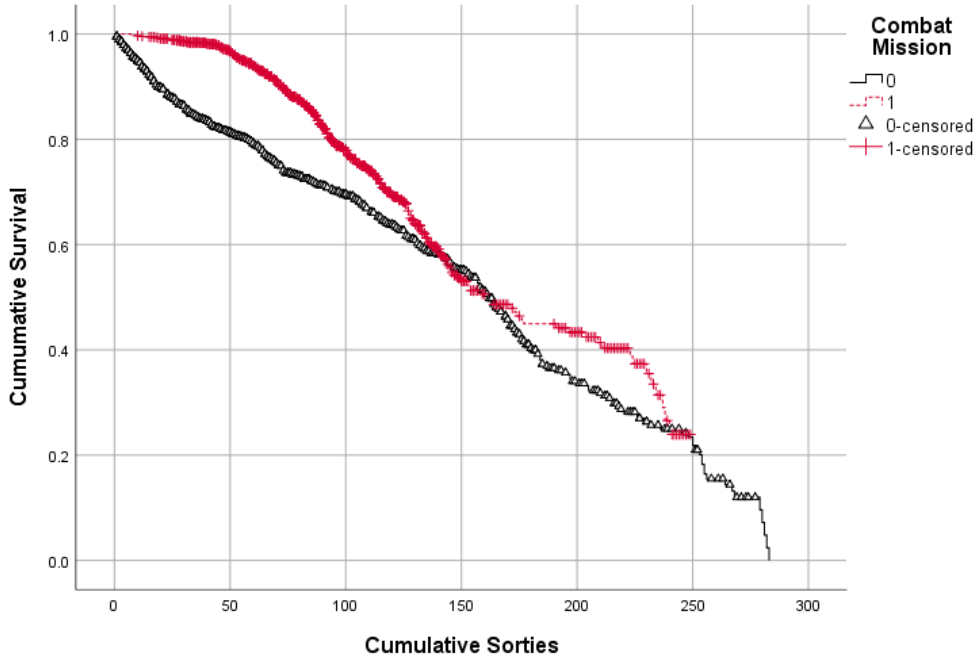

Figure 1: Kaplan-Meier Survival Functions for Combat and Non-Combat Missions

In Figure 1, two functions are overlapping around 150 and 250 sorties. As the 95 percent confidence intervals are not independent in Table 4, Figure 1 confirms that two types of missions yield overlapping survival functions when the observations for 17 aircraft are pooled for analysis.

The KM hazards functions (see Figure 2) follow similar patterns found in Figure 1. Overall, non-parametric models or KM estimators fail to discern the survival hazards functions by mission types.

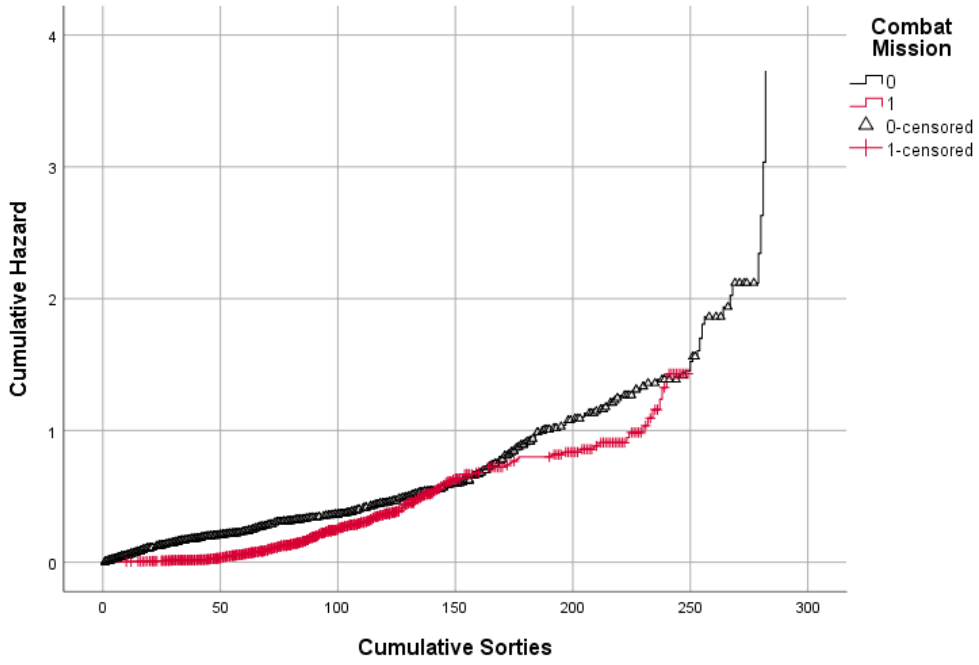

Figure 2: Kaplan-Meier Hazards Functions for Combat and Non-Combat Missions

A Cox proportional hazards model, a semi-parametric approach, is employed to confirm the factors that affect the survival of the aircraft. The results of the model are presented in Table 5. The dependent variable of this model is the number of failure events. Time is measured using the cumulative number of sorties during the observation period. R with the survival package is used for estimating the Cox proportional hazards function.

Table 5: Cox Proportional-Hazard Regression Results

	Coef	Exp (Coef)	SE (Coef)	z	Pr(>|z|)	Lower (95%)	Upper (95%)
Combat Mission	0.0792	1.0824	0.1199	0.661	0.5089	0.8558	1.3690
Flight Hours between Failures	-0.0041	0.9959	0.0015	-2.736	0.0062***	0.9930	0.9988
Flight Hours	-0.0670	0.9352	0.0132	-5.063	0.0000***	0.9113	0.9598
Flight Hours (Lagged)	0.0067	1.0068	0.01241	0.542	0.5876	0.9826	1.0315

Significance: *** = significant at 0.01

The change in the log-likelihood values from -4,468.748 to -4,436.381 is statistically significant at $\alpha = 0.01$, proving the validity of this model. Two variables such as combat mission and flight hours (lagged) are not significant in the model. The remaining two variables, flight hours between failures and flight hours (per sortie) are statistically significant at $\alpha = 0.01$. Before interpreting these significant variables, it must be ensured that failure events in the model are recurrent and need to be treated accordingly.

The next model, a Cox proportional hazard regression with shared frailty is used. The exponentiated regression coefficient for flight hours between failures is less than one, which implies that this variable moves the opposite direction to that of the failure rate. The magnitude of the variable is $[(0.9959 - 1) \times 100\% = 0.41\%]$ or 0.41 percent when other variables are held. That is, one hour increase in flight hours between failures will decrease failure hazards by 0.41 percent. Holding other variables constant, one hour

increase in flight hours per sortie will reduce the failure hazards by 6.48 percent. Therefore, it can be concluded that increased flight hours can reduce failure rates as Williams (2017) claimed. However, as shown in Table 3, the more reliable aircraft flew longer hours than the less reliable aircraft. In addition, when a malfunction on an aircraft is found during the flight, the airplane air aborts a mission and returns to base, therefore having fewer flight hours. Accordingly, these results show mathematical relationships, not causal relationships. Therefore, based on these findings, recommending longer flight hours to decrease the hazards rate is questionable. The appropriate interpretation is that reliable aircraft fly longer hours than unreliable aircraft as confirmed it in Table 3.

Table 3 shows that some aircraft have more flight hours and combat sorties than other aircraft during the observation period. It indicates that the aircraft that are frail to failures have fewer flight hours than the aircraft that are not. To examine the frailty of subjects on the model and handle recurrent events or failures, a Cox proportional hazards (PH) model with shared frailty is conducted, which is a random effect model. The same dependent and independent variables along with the same time measure are included in this model. Table 6 exhibits results of the model.

Table 6: Cox PH Regression Results with Shared Frailty

	Coef	Exp (Coef)	SE (Coef)	χ^2	*p*	Lower (95%)	Upper (95%)
Combat Mission	0.6163	1.8520	0.1329	21.49	0.0000***	1.4272	2.4032
Flight Hours between Failures	-0.0021	0.9979	0.0015	2.04	0.1500	0.9950	1.0008
Flight Hours	-0.0683	0.9339	0.0134	26.00	0.0000***	0.9097	0.9588
Flight Hours (Lagged)	0.0068	1.0068	0.0130	0.28	0.6000	0.9816	1.0327
Frailty (ID)				880.80	0.0000***		

Note: Variance of random effect = 0.9912***
Significance: *** = significant at 0.01

The change in the loglikelihood values from -4,468.748 to -4,261.436 is significant for the validity of the model. Frailty is measured by including identification numbers (ID). The same identification number is assigned for the failure events of a specific aircraft. The significance of frailty (ID) confirms the existence of frailty among the aircraft in the model. The indicator of frailty or the variance of random effect, which should be zero if no frailty presents, takes the value of 0.9923. When accounted for frailty, results are different from the model without it. Combat mission and flight hours per sortie are significant at $\alpha = 0.01$. Combat mission, a dummy variable, increase a failure rate by 85.2 percent for combat sorties compared to non-combat sorties. Again, caution must be used when interpreting combat mission. It is reasonable to conclude the most reliable aircraft are assigned for combat missions. Regression models can be used for confirming causal relationships but they are not sufficient to prove the causal relationships. Other measures such as theories, experiments, and temporal relationships

should be considered. Therefore, this study does not support the claim that B-1B's should fly longer sorties to reduce failure hazards.

To confirm the results in Table 6, two similar aircraft are selected: numbers 1 and 12, with 410 observations and 125 failures. The results of the Cox PH regression model are presented in Table 7.

Table 7: Cox PH Regression Results with Shared Frailty for Similar Aircraft

	Coef	Exp (Coef)	SE (Coef)	χ^2	*p*	Lower (95%)	Upper (95%)
Combat Mission	2.2086	9.1029	0.0322	46.86	0.0000***	4.8366	17.1323
Flight Hours between Failures	0.0018	1.0018	0.0025	0.50	0.4800	0.9969	1.0067
Flight Hours	-0.0758	0.9270	0.0272	7.78	0.0053***	0.8789	0.9777
Flight Hours (Lagged)	-0.0059	0.9941	0.0279	0.05	0.8300	0.9411	1.0500
Frailty (ID)				0.17	0.4200		

Note: Variance of random effect = 0.0013
Significance: *** = significant at 0.01

The results in Table 7 are similar to those in Table 6 except frailty is not significant, and the variance of random effect is close to zero (0.0013). Frailty is confirmed among the aircraft. In the future, when the reliability of aircraft are analyzed, it is necessary to group aircraft for frailty and develop models accordingly. If not, the estimated coefficients may be misleading.

Regarding the hypotheses, the results with frailty support "H1: Combat missions will increase failure rates." The statistic for H2 is significant but its direction is reversed. In addition, because the reliable aircraft fly longer than the less reliable ones, further

study is needed on this issue. The statistics for H3 and H4 are insignificant and inconclusive at this time.

This study demonstrates the application of survival analysis to analyzing the reliability of the B-1B Lancer. Survival analysis is known to be superior to logistics regression for incorporating time and treating recurrent events. At the time of this study, there were no other studies with survival analysis on military aircraft. Therefore, the major contributions of this study are trifold: first, incorporating time and recurrent events using survival analysis, second, proposing a pertinent research framework for the survival analysis of military aircraft, and third, providing appropriate insights for predicting aircraft failures. This study can be extended to analyzing the reliability of various types of aircraft and weapon systems. In addition, the framework in this research can be applied to studies on testing and evaluating new products or systems that experience oscillating behaviors between two states such as working or not working. Finally, this study needs further efforts to improve due to some limitations.

This study is exploratory in nature, and additional studies that address the limitations and future directions are recommended, such as: including time-dependent variables such as the age of the aircraft, modeling different types of episodes, testing fully parametric survival models, applying survival analysis to major components or line replaceable units such as engines, navigation systems, etc., and trying survival analysis with different aircraft types such as cargo, tanker, and fighter aircraft.

VI. Conclusion

The Secretary of the United States Air Force and Chief of Staff of the Air Force expressed their concern on shrinking aircraft inventory, aging aircraft fleets, and flying beyond expected service life in the 2017 posture statement to the US Senate Armed Services Committee. In 2014, the average mission capable rate for the Air Force fleet was 75 percent, with the lowest rate belonging to the B-1B Lancer at 47.7 percent (Everstine, 2014).

This study examines the reliability of the B-1B Lancer using the sample dataset from 17 B-1B aircraft. Unlike the previous study (Williams, 2017), which uses logistics regression, this study applies survival analysis to the data set for identifying factors that affect the failures of the B-1B Lancer. The major advantages of survival analysis over logistics regression are incorporating time and handling recurrent events such as failures, in its model. When considering failures as recurrent events in a Cox partial hazards model with frailty, it is shown that some aircraft are frailer than others, and combat missions increase hazards. The other significant variable is flight hours, which has the exponentiated coefficient slightly smaller than one (1) in the model.

Because the Air Force puts longer flight hours and combat missions on more reliable aircraft than less reliable ones, the use of caution is required for the interpretation of this variable. The reliable airplanes fly longer hours as proven in Tables 3 and 6. It happens when unobserved heterogeneity exists in a model. Survival analysis assumes the homogeneity of subjects in an ordinary model.

Unobserved heterogeneity such as more reliable or less reliable airplanes in this study can hinder proper estimates of parameters in the model. Thus, this study proposes grouping aircraft by reliability categories or other criteria and investigating their reliability. This study can be extended to analyzing the reliability of various types of aircraft and weapon systems. The framework in this research can be also applied to studies on testing and evaluating new products or systems that experience oscillating behaviors between two states such as working or not working.

Major contributions of this study include proposing a research framework for the survival analysis of aircraft, modeling failures as recurrent events, and providing managerial insights. This study also comes with limitations that should be addressed in the future. They are including time-dependent variables, modeling various types of episodes, testing fully parametric survival models, conducting survival analysis at a major component level, and expanding the study to the variety of aircraft. Since this study is an initial attempt and exploratory for the Air Force, we expect additional studies in this area.

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Appendix A: Excel Data File

EQPID	JULIAN DATE	Operating Time in Days Since Last Failure	Mission1 (1=Combat)	Mission2 (1=Depot)	HRS	Cumulative Flight Hours	Cumulative Sorties	*ANY FAILURE*
A5060	**13330**	1	0	0	2.1	5.6	3	0
A5060	**13339**	9	0	0	10.9	16.5	4	1
A5060	**13343**	4	0	0	2.5	25.4	7	0
A5060	**13345**	6	0	0	1.9	27.3	8	1
A5060	**13347**	2	0	0	5	32.3	10	0
A5060	**13351**	6	0	0	3.6	33.9	11	1
A5060	**13354**	3	0	0	1.9	35.8	12	1
A5060	**14003**	14	0	0	2.2	38	13	0
A5060	**14003**	14	0	0	2	40	14	1
A5060	**14031**	28	0	0	2.1	42.1	15	1
A5060	**14043**	12	0	1	9.5	51.6	16	0
A5060	**14044**	13	0	1	7.9	59.5	17	0
A5060	**14046**	15	1	0	12.9	72.4	18	1
A5060	**14048**	2	1	0	12.3	84.7	19	1
A5060	**14050**	2	1	0	11.8	96.5	20	1
A5060	**14051**	1	1	0	12.3	108.8	21	0
A5060	**14055**	5	1	0	12.1	120.9	22	0
A5060	**14056**	6	1	0	12.3	133.2	23	0
A5060	**14058**	8	1	0	12.6	145.8	24	1
A5060	**14060**	2	1	0	12.7	158.8	25	1
A5060	**14066**	6	1	0	11.3	170.1	26	0
A5060	**14067**	7	1	0	12.5	182.6	27	0
A5060	**14068**	8	1	0	12.4	195	28	0
A5060	**14069**	9	1	0	12.4	207.4	29	1
A5060	**14071**	2	1	0	10.8	218.2	30	0
A5060	**14072**	3	1	0	12.6	230.8	31	0
A5060	**14073**	4	1	0	12.8	243.6	32	0
A5060	**14075**	6	1	0	11.8	255.4	33	0
A5060	**14077**	8	1	0	11.9	267.3	34	0
A5060	**14078**	9	1	0	14.1	281.4	35	0

A5060	**14080**	11	1	0	13.1	294.5	36	0
A5060	**14081**	12	1	0	12.2	306.7	37	1
A5060	**14084**	3	1	0	15.6	322.3	38	0
A5060	**14085**	4	1	0	12.1	334.4	39	0
A5060	**14092**	11	1	0	12.3	346.7	40	0
A5060	**14094**	13	1	0	12.3	359	41	0
A5060	**14095**	14	1	0	13.1	372.1	42	0
A5060	**14096**	15	1	0	12.6	384.7	43	0
A5060	**14097**	16	1	0	11.3	396	44	0
A5060	**14098**	17	1	0	12.7	408.7	45	0
A5060	**14100**	19	1	0	13.1	421.8	46	0
A5060	**14104**	23	1	0	11.6	433.4	47	0
A5060	**14105**	24	1	0	12.1	445.5	48	0
A5060	**14106**	25	1	0	11.9	457.4	49	0
A5060	**14108**	27	1	0	12.2	469.6	50	0
A5060	**14110**	29	1	0	14.2	483.8	51	1
A5060	**14112**	2	1	0	13.2	497	52	0
A5060	**14113**	3	1	0	12.7	509.7	53	0
A5060	**14114**	4	1	0	11	520.7	54	0
A5060	**14116**	5	1	0	12.2	532.9	55	1
A5060	**14117**	1	1	0	12	544.9	56	0
A5060	**14118**	2	1	0	12.2	557.1	57	1
A5060	**14120**	2	1	0	12.1	569.2	58	0
A5060	**14121**	3	1	0	12.2	581.4	59	0
A5060	**14123**	5	1	0	7.3	588.7	60	1
A5060	**14125**	2	1	0	21.4	610.1	62	0
A5060	**14127**	4	1	0	1.1	611.2	63	0
A5060	**14129**	6	1	0	12.5	623.7	64	0
A5060	**14131**	8	1	0	12.2	635.9	65	0
A5060	**14132**	9	1	0	13.5	649.4	66	0
A5060	**14134**	11	1	0	12.2	661.6	67	0
A5060	**14136**	13	1	0	12.6	674.2	68	0
A5060	**14137**	15	1	0	12.7	686.9	69	0
A5060	**14139**	17	1	0	10	696.9	70	0
A5060	**14141**	19	1	0	13.5	710.4	71	0
A5060	**14142**	20	1	0	10.6	721	72	0
A5060	**14143**	21	1	0	13	747.5	73	0

A5060	**14144**	22	1	0	13.5	761	74	0
A5060	**14146**	24	1	0	12.7	773.7	75	0
A5060	**14147**	25	1	0	12.3	786	76	0
A5060	**14148**	26	1	0	13.2	799.2	78	0
A5060	**14149**	27	1	0	12.3	811.5	79	0
A5060	**14152**	30	1	0	12.9	824.4	80	0
A5060	**14154**	32	1	0	12.1	836.5	81	0
A5060	**14155**	33	1	0	12.8	849.3	82	0
A5060	**14157**	35	1	0	10.6	859.9	83	0
A5060	**14159**	37	1	0	12.8	872.7	84	0
A5060	**14160**	38	1	0	13.1	885.8	85	0
A5060	**14162**	40	1	0	14.1	899.9	86	0
A5060	**14164**	42	1	0	10.4	910.3	87	1
A5060	**14170**	6	1	0	13.8	924.1	88	0
A5060	**14172**	8	1	0	12.9	937	89	0
A5060	**14174**	10	1	0	12	949	90	0
A5060	**14175**	11	1	0	12.5	961.5	91	0
A5060	**14176**	12	1	0	11	972.5	92	1
A5060	**14177**	1	1	0	12.7	985.2	93	0
A5060	**14178**	2	1	0	11.6	996.8	94	0
A5060	**14179**	3	1	0	11.5	1008.3	95	0
A5060	**14180**	4	1	0	11.8	1020.1	96	0
A5060	**14181**	5	1	0	11.8	1031.9	97	0
A5060	**14183**	6	1	0	11.8	1043.7	98	0
A5060	**14184**	7	1	0	12.2	1055.9	99	0
A5060	**14185**	8	1	0	11.9	1067.8	100	0
A5060	**14186**	9	1	0	12.3	1080.1	101	0
A5060	**14188**	11	1	0	12.3	1092.4	102	0
A5060	**14190**	13	1	0	11.8	1104.2	103	1
A5060	**14192**	2	1	0	12.4	1116.6	104	0
A5060	**14194**	4	1	0	12.2	1128.8	105	1
A5060	**14196**	2	1	0	12.7	1141.5	106	1
A5060	**14197**	1	1	0	12.7	1154.2	107	0
A5060	**14199**	3	1	0	12.7	1166.9	108	0
A5060	**14200**	4	1	0	13.4	1180.3	109	0
A5060	**14201**	5	1	0	11.3	1191.6	110	0
A5060	**14203**	7	1	0	13.2	1204.8	111	0

A5060	**14205**	9	1	0	7.8	1212.6	112	1
A5060	**14206**	1	1	0	13.1	1225.7	113	1
A5060	**14208**	2	1	0	1	1226.7	114	1
A5060	**14209**	1	1	0	1	1227.7	115	1
A5060	**14210**	1	1	0	12.5	1240.2	116	0
A5060	**14211**	2	1	0	12.1	1252.3	117	0
A5060	**14213**	4	1	0	12.6	1264.9	118	0
A5060	**14216**	7	1	0	12.3	1277.2	119	0
A5060	**14219**	10	1	0	11.5	1288.7	120	0
A5060	**14220**	11	1	0	11.2	1299.9	121	0
A5060	**14223**	14	1	0	12.6	1312.5	122	0
A5060	**14224**	15	1	0	11.8	1324.3	123	1
A5060	**14226**	2	1	0	12.6	1336.9	124	0
A5060	**14229**	5	1	0	10.1	1347	125	0
A5060	**14230**	6	1	0	2	1349	126	1
A5060	**14232**	2	1	0	12.4	1361.4	127	1
A5060	**14234**	2	1	0	11.9	1373.3	128	0
A5060	**14235**	3	1	0	12.9	1386.2	129	1
A5060	**14239**	4	1	0	12.8	1399	130	1
A5060	**14243**	4	1	0	12	1411	131	0
A5060	**14244**	5	1	0	10.6	1421.6	132	0
A5060	**14246**	7	1	0	12.3	1433.9	133	1
A5060	**14247**	1	1	0	12.5	1446.4	134	0
A5060	**14248**	2	1	0	10.3	1456.7	135	1
A5060	**14249**	1	1	0	15.7	1472.4	136	1
A5060	**14250**	1	1	0	12.5	1484.9	137	0
A5060	**14252**	3	1	0	12.4	1497.3	138	0
A5060	**14254**	5	1	0	12.7	1510	139	0
A5060	**14255**	6	1	0	12.5	1522.5	140	0
A5060	**14257**	8	1	0	13.1	1535.6	141	0
A5060	**14258**	9	1	0	12.2	1547.8	142	0
A5060	**14259**	10	1	0	12	1559.8	143	0
A5060	**14261**	12	1	0	12	1571.8	144	1
A5060	**14262**	1	1	0	11.8	1583.6	145	0
A5060	**14266**	5	1	0	11.7	1595.3	146	1
A5060	**14268**	2	1	0	12.4	1607.7	147	1
A5060	**14270**	2	1	0	13.5	1621.2	148	0

A5060	**14271**	3	1	0	13.1	1634.3	149	1
A5060	**14272**	1	1	0	13.1	1647.4	150	0
A5060	**14273**	2	1	0	13	1660.4	151	0
A5060	**14274**	3	1	0	9.8	1670.2	152	1
A5060	**14274**	0	1	0	10.3	1680.5	153	1
A5060	**14275**	1	1	0	10.9	1691.4	154	0
A5060	**14276**	2	1	0	11	1702.4	155	0
A5060	**14278**	4	1	0	12.6	1715	156	0
A5060	**14279**	5	1	0	11.8	1726.8	157	0
A5060	**14280**	6	1	0	12.8	1739.6	158	1
A5060	**14282**	2	1	0	13	1752.6	159	0
A5060	**14288**	8	1	0	12.5	1765.1	160	0
A5060	**14290**	10	1	0	6.2	1771.3	161	1
A5060	**14292**	2	1	0	7.7	1779	162	1
A5060	**14293**	1	1	0	1.1	1780.1	163	1
A5060	**14294**	1	1	0	12.9	1793	164	0
A5060	**14296**	3	1	0	13.9	1806.9	165	0
A5060	**14298**	5	1	0	7.9	1814.8	166	0
A5060	**14299**	6	1	0	12.7	1827.5	167	0
A5060	**14302**	9	1	0	13	1840.5	168	0
A5060	**14305**	12	1	0	13	1853.5	169	0
A5060	**14306**	13	1	0	13	1866.5	170	0
A5060	**14309**	16	1	0	11.3	1877.8	171	1
A5060	**14330**	21	1	0	12.2	1890	172	0
A5060	**14333**	24	1	0	13.5	1903.5	173	1
A5060	**14344**	11	1	0	1.1	1904.6	174	1
A5060	**14346**	2	1	0	1.1	1905.7	175	0
A5060	**14348**	4	1	0	3.9	1909.6	176	1
A5060	**14364**	16	1	0	1.2	1910.8	177	1
A5060	**15005**	6	0	1	21.6	1932.4	178	1
A5060	**15041**	36	0	0	3.3	1935.7	179	0
A5060	**15104**	99	0	0	1.7	1937.4	180	1
A5060	**15106**	2	0	0	4	1941.4	182	0
A5060	**15106**	3	0	0	5	1946.4	183	1
A5060	**15134**	28	0	0	5	1951.4	184	1
A5060	**15162**	28	0	0	3.2	1954.6	185	1
A5060	**15166**	4	0	0	1.7	1956.3	186	0

A5060	**15166**	4	0	0	1.7	1958	187	1
A5060	**15188**	22	0	0	8	1966	188	1
A5060	**15231**	43	0	0	6.4	1972.4	190	0
A5060	**15233**	45	0	0	2.2	1974.6	191	1
A5060	**15237**	4	0	0	5.6	1980.2	193	0
A5060	**15239**	6	0	0	3.1	1983.3	194	0
A5060	**15239**	6	0	0	3	1986.3	195	1
A5060	**15302**	63	0	0	3.8	1990.1	196	0
A5060	**15302**	63	0	0	4	1994.1	197	1
A5060	**15307**	5	0	0	2	1996.1	198	1
A5060	**15309**	2	0	0	5	2001.1	199	0
A5060	**15309**	2	0	0	2.8	2003.9	200	1
A5060	**15345**	36	0	0	4.6	2008.5	202	0
A5060	**16006**	62	0	0	3.3	2011.8	203	0
A5060	**16006**	62	0	0	2.8	2014.6	204	1
A5060	**16019**	13	0	0	2.9	2017.5	205	1
A5060	**16047**	28	0	0	8.2	2025.7	208	0
A5060	**16049**	30	0	0	2.8	2028.5	209	0
A5060	**16049**	30	0	0	2.2	2030.7	210	1
A5060	**16056**	7	0	0	1.7	2032.4	211	1
A5060	**16098**	41	0	0	6.1	2038.5	212	0
A5060	**16101**	44	0	0	3.4	2041.9	213	0
A5060	**16102**	45	0	0	3.9	2045.8	214	1
A5060	**16106**	4	0	0	2.3	2048.1	215	1
A5060	**16111**	5	0	0	2.7	2050.8	216	0
A5060	**16113**	7	0	0	3.4	2054.2	217	0
A5060	**16119**	13	0	0	2	2056.2	218	0
A5060	**16137**	31	0	0	3.6	2059.8	219	1
A5060	**16158**	21	0	0	9.9	2069.7	222	0
A5060	**16160**	23	0	0	10.8	2080.5	225	0
A5060	**16162**	25	0	0	3.9	2084.4	226	1
A5060	**16174**	12	0	0	4	2088.4	227	0
A5060	**16176**	14	0	0	2.1	2090.5	228	1
A5060	**16176**	0	0	0	2.2	2092.7	229	1
A5060	**16187**	11	0	0	1.8	2094.5	230	0
A5060	**16189**	13	0	0	5.7	2100.2	232	0
A5060	**16193**	17	0	0	7.3	2107.5	235	0

A5060	**16195**	19	0	0	3.2	2110.7	236	1
A5060	**16197**	2	0	0	4.7	2115.4	238	0
A5060	**16201**	6	0	0	1.7	2117.1	239	0
A5060	**16203**	8	0	0	5.4	2122.5	241	0
A5060	**16214**	19	0	0	7.8	2130.3	244	0
A5060	**16223**	28	0	1	16.1	2146.4	245	1
A5060	**16230**	7	0	0	6.4	2152.8	247	0
A5060	**16234**	11	0	0	2.8	2155.6	248	1
A5060	**16238**	4	0	0	2.9	2158.5	249	0
A5060	**16238**	4	0	0	1.9	2160.4	250	1
A5060	**16251**	13	0	0	3.5	2163.9	251	0
A5060	**16256**	18	0	1	10.2	2174.1	252	0
A5060	**16261**	23	0	0	3.6	2177.7	253	1
A5060	**16271**	7	0	1	2.4	2180.1	254	1
A5060	**16306**	35	0	0	3.3	2183.4	255	1
A5066	**13275**	1	0	0	5.6	5.6	2	0
A5066	**13277**	3	0	0	5.1	10.7	4	0
A5066	**13280**	6	0	0	5.5	16.2	6	0
A5066	**13281**	7	0	0	2.8	19	7	0
A5066	**13283**	9	0	0	6.5	25.5	9	0
A5066	**13289**	15	0	0	3	28.5	10	1
A5066	**13294**	5	0	0	6.4	32.9	12	0
A5066	**13296**	7	0	0	5.4	38.3	14	0
A5066	**13298**	9	0	0	2.5	40.8	15	1
A5066	**13304**	6	0	0	6.5	47.3	17	0
A5066	**13309**	11	0	0	2.3	49.6	18	0
A5066	**13311**	13	0	0	2.6	52.2	19	0
A5066	**13316**	18	0	0	7.7	59.9	21	0
A5066	**13318**	20	0	0	8	67.9	23	0
A5066	**13322**	24	0	0	1.9	69.8	24	0
A5066	**13322**	24	0	0	2.1	71.9	25	1
A5066	**13343**	21	0	0	2.2	74.1	26	1
A5066	**13345**	2	0	0	8.6	82.7	29	0
A5066	**13347**	4	0	0	2.8	85.5	30	0
A5066	**13354**	11	0	0	1.8	87.3	31	0
A5066	**13354**	11	0	0	1.6	88.9	32	1
A5066	**14021**	32	0	0	4.2	93.1	33	0

A5066	**14023**	34	0	0	3.4	96.5	34	0
A5066	**15006**	382	0	1	1.6	98.1	35	0
A5066	**15013**	389	0	0	5.1	103.2	36	0
A5066	**15013**	389	0	0	2.5	105.7	37	1
A5066	**15015**	2	0	0	4.9	110.6	38	0
A5066	**15021**	8	0	0	3	113.6	39	1
A5066	**15040**	19	0	0	7.7	121.3	40	0
A5066	**15042**	21	0	0	7.3	128.6	41	0
A5066	**15044**	23	0	0	3.3	131.9	42	0
A5066	**15044**	23	0	0	2.4	134.3	43	1
A5066	**15051**	7	0	0	5.3	139.6	45	0
A5066	**15055**	11	0	0	10	149.6	48	0
A5066	**15061**	17	0	0	3.1	152.7	49	1
A5066	**15063**	2	0	0	6	158.7	51	0
A5066	**15064**	3	0	0	4.1	162.8	52	0
A5066	**15065**	4	0	0	6.2	169	54	0
A5066	**15068**	7	0	0	2.2	171.2	55	1
A5066	**15070**	2	0	0	3.2	174.4	56	0
A5066	**15071**	3	0	0	3.3	177.7	57	0
A5066	**15072**	4	0	0	4	181.7	58	1
A5066	**15079**	7	0	0	2.3	184	59	1
A5066	**15082**	3	0	0	10.3	194.3	62	0
A5066	**15084**	5	0	0	4.8	199.1	63	0
A5066	**15084**	5	0	0	5.4	204.5	64	1
A5066	**15093**	9	0	0	2.5	207	65	1
A5066	**15113**	21	0	0	3.7	210.7	66	1
A5066	**15118**	5	0	0	6.3	217	67	1
A5066	**15119**	1	0	0	6.1	223.1	68	0
A5066	**15120**	2	0	0	5.8	228.9	69	0
A5066	**15125**	7	0	0	6.3	235.2	70	0
A5066	**15127**	9	0	0	5.5	240.7	71	1
A5066	**15183**	55	0	0	1.3	242	72	0
A5066	**15183**	56	0	0	2.2	244.2	73	1
A5066	**15243**	60	0	0	7.1	251.3	75	0
A5066	**15245**	62	0	0	8.8	260.1	77	0
A5066	**15252**	69	0	0	5.3	265.4	78	0
A5066	**15254**	71	0	0	1.6	267	79	0

A5066	**15259**	76	1	0	17.2	284.2	80	0
A5066	**15261**	78	1	0	12.5	296.7	81	0
A5066	**15263**	80	1	0	10.8	307.5	82	0
A5066	**15264**	81	1	0	10.8	318.3	83	0
A5066	**15266**	83	1	0	12.7	331	84	1
A5066	**15267**	1	1	0	8.4	339.4	85	0
A5066	**15269**	3	1	0	10.5	349.9	86	0
A5066	**15271**	5	1	0	10	359.9	87	0
A5066	**15277**	11	1	0	10.2	370.1	88	1
A5066	**15284**	7	1	0	11.3	381.4	89	0
A5066	**15286**	9	1	0	11.9	393.3	90	0
A5066	**15288**	11	1	0	13.4	406.7	91	0
A5066	**15289**	12	1	0	11.2	417.9	92	1
A5066	**15292**	3	1	0	1.2	419.1	93	1
A5066	**15296**	4	1	0	0.9	420	94	1
A5066	**15299**	3	1	0	12.1	432.1	95	1
A5066	**15311**	12	1	0	11	443.1	96	1
A5066	**15315**	4	1	0	10.2	453.3	97	0
A5066	**15317**	6	1	0	11.5	464.8	98	0
A5066	**15318**	7	1	0	11.2	476	99	0
A5066	**15320**	9	1	0	11.2	487.2	100	0
A5066	**15322**	11	1	0	13	500.2	101	0
A5066	**15324**	13	1	0	12.1	512.3	102	0
A5066	**15325**	14	1	0	12.8	525.1	103	0
A5066	**15327**	16	1	0	12.5	537.6	104	0
A5066	**15330**	19	1	0	11.3	548.9	105	0
A5066	**15332**	21	1	0	12.1	561	106	0
A5066	**15334**	23	1	0	9.1	570.1	107	0
A5066	**15335**	24	1	0	10.9	581	108	0
A5066	**15337**	26	1	0	9.5	590.5	109	0
A5066	**15338**	27	1	0	10.5	601	110	0
A5066	**15340**	29	1	0	8.8	609.8	111	0
A5066	**15341**	30	1	0	9.2	619	112	0
A5066	**15343**	32	1	0	8.1	627.1	113	0
A5066	**15345**	34	1	0	8.4	635.5	114	1
A5066	**15346**	1	1	0	6.4	641.9	115	1
A5066	**15348**	2	1	0	9.2	651.1	116	1

A5066	**15351**	3	1	0	10.6	661.7	117	0
A5066	**15352**	4	1	0	12.6	674.3	118	0
A5066	**15363**	15	1	0	6.2	680.5	119	0
A5066	**16002**	19	1	0	9.9	690.4	120	1
A5066	**16004**	2	1	0	9.6	700	121	0
A5066	**16005**	3	1	0	11.7	711.7	122	0
A5066	**16006**	4	1	0	8.3	720	123	0
A5066	**16008**	6	1	0	13.1	733.1	124	0
A5066	**16015**	13	1	0	9.7	742.8	125	1
A5066	**16022**	7	1	0	19.9	762.7	126	0
A5066	**16035**	20	0	0	9.1	771.8	129	0
A5066	**16041**	26	0	0	7.9	779.7	132	0
A5066	**16048**	33	0	0	5.7	785.4	135	0
A5066	**16050**	35	0	0	4.8	790.2	137	0
A5066	**16056**	41	0	0	3.9	794.1	138	0
A5066	**16060**	45	0	0	2.9	797	139	0
A5066	**16060**	46	0	0	2.9	799.9	140	1
A5066	**16133**	73	0	0	4	803.9	141	0
A5066	**16133**	73	0	0	3.1	807	142	1
A5066	**16140**	7	0	0	3.7	810.7	143	0
A5066	**16142**	9	0	0	3.9	814.6	144	0
A5066	**16154**	21	0	0	3.7	818.3	145	1
A5066	**16159**	5	0	0	4.2	822.5	146	1
A5066	**16161**	2	0	0	4	826.5	147	0
A5066	**16161**	2	0	0	3.1	829.6	148	1
A5066	**16167**	6	0	0	2.7	832.3	149	0
A5066	**16169**	8	0	0	5.6	837.9	151	0
A5066	**16173**	12	0	0	8.8	846.7	154	0
A5066	**16175**	14	0	0	8.4	855.1	156	0
A5066	**16193**	32	0	0	4.9	860	158	0
A5066	**16195**	34	0	0	4.5	864.5	160	0
A5066	**16208**	47	0	0	6.5	871	161	1
A5066	**16210**	2	0	0	8.4	879.4	163	0
A5066	**16218**	10	0	0	15.9	895.3	164	1
A5066	**16241**	23	0	0	6.9	902.2	165	0
A5066	**16243**	25	0	0	3.2	905.4	166	0
A5066	**16243**	26	0	0	3.3	908.7	167	0

A5066	**16244**	27	0	0	7.6	916	169	0
A5066	**16249**	32	0	0	3.4	919.4	170	0
A5066	**16249**	32	0	0	3.7	923.1	171	1
A5066	**16251**	2	0	0	2.8	925.9	172	1
A5066	**16266**	15	0	0	2.1	928	173	0
A5066	**16266**	15	0	0	2.6	930.6	174	1
A5066	**16308**	42	0	0	3.7	934.3	175	0
A5066	**16308**	42	0	0	3.8	938.1	176	1
A5066	**16320**	12	0	1	11	949.1	177	0
A5066	**16321**	13	0	0	2.6	951.7	178	1
A5066	**16323**	2	0	0	2.7	954.4	179	0
A5066	**16326**	5	0	0	4.9	959.3	180	0
A5066	**16326**	5	0	0	2.7	962	181	1
A5066	**16332**	6	0	1	11.1	973.1	182	0
A5066	**16333**	7	0	1	12.4	985.5	183	1
A5069	**14247**	1	0	0	2.6	2.6	1	1
A5069	**14253**	7	0	0	2.5	5.1	2	1
A5069	**14253**	0	0	0	5.7	10.8	3	0
A5069	**14255**	3	0	0	8.2	19	4	0
A5069	**14258**	6	0	0	6	25	6	0
A5069	**14259**	7	0	0	5.3	30.3	7	0
A5069	**14259**	7	0	0	2.8	33.1	8	1
A5069	**14260**	1	0	0	3.1	36.2	9	1
A5069	**14274**	14	0	0	11	47.2	12	0
A5069	**14276**	16	0	0	7	54.2	13	0
A5069	**14279**	19	0	0	7	61.2	16	0
A5069	**14281**	21	0	0	8.2	69.4	19	0
A5069	**14287**	27	0	0	9	78.4	21	0
A5069	**14289**	29	0	0	8.3	86.7	23	0
A5069	**14301**	41	0	0	1.9	88.6	24	0
A5069	**14303**	43	0	0	3.2	91.8	25	0
A5069	**14308**	48	0	0	13.3	105.1	26	0
A5069	**14310**	50	0	0	2.9	108	27	1
A5069	**14317**	7	0	0	2.5	110.5	28	0
A5069	**14319**	9	0	0	5.8	116.3	30	0
A5069	**14321**	11	0	0	2.6	118.9	31	1
A5069	**14322**	1	0	0	2.9	121.8	32	0

A5069	**14323**	2	0	0	2	123.8	33	0
A5069	**14325**	4	0	0	4	127.8	34	0
A5069	**14329**	8	0	0	3.6	131.4	35	0
A5069	**14329**	8	0	0	2.5	133.9	36	1
A5069	**14337**	8	0	0	8.2	142.1	39	0
A5069	**14339**	10	0	0	3.4	145.5	40	0
A5069	**14351**	22	0	0	3.6	149.1	41	0
A5069	**14351**	23	0	0	2.2	151.3	42	0
A5069	**14353**	25	0	0	4.5	155.8	43	0
A5069	**14356**	28	0	0	2.9	158.7	44	1
A5069	**14364**	8	1	0	17.4	176.1	45	1
A5069	**15002**	3	1	0	9.3	185.4	46	1
A5069	**15004**	2	1	0	13.1	198.5	47	1
A5069	**15007**	3	1	0	12.1	210.6	48	0
A5069	**15009**	5	1	0	15	225.6	49	0
A5069	**15011**	7	1	0	14.5	240.1	50	1
A5069	**15014**	3	1	0	12.1	252.2	51	1
A5069	**15015**	1	1	0	12.8	265	52	0
A5069	**15017**	3	1	0	13.4	278.4	53	1
A5069	**15018**	1	1	0	12.6	291	54	1
A5069	**15024**	6	1	0	12.7	303.7	55	0
A5069	**15027**	9	1	0	16.5	320.2	56	0
A5069	**15029**	11	1	0	12.2	332.4	57	0
A5069	**15031**	13	1	0	13.1	345.5	58	0
A5069	**15032**	14	1	0	12.9	358.4	59	0
A5069	**15035**	17	1	0	5.7	364.1	60	1
A5069	**15037**	2	1	0	11.9	376	61	1
A5069	**15039**	2	1	0	9.1	385.1	62	0
A5069	**15062**	25	1	0	12.4	397.5	63	1
A5069	**15066**	5	1	0	11.6	409.1	64	0
A5069	**15068**	7	1	0	10.3	419.4	65	0
A5069	**15069**	8	1	0	12.6	432	66	0
A5069	**15071**	10	1	0	11.5	443.5	67	1
A5069	**15073**	2	1	0	11.4	454.9	68	0
A5069	**15074**	3	1	0	11.5	466.4	69	1
A5069	**15076**	2	1	0	12.5	478.9	70	0
A5069	**15077**	3	1	0	12.4	491.3	71	1

A5069	**15079**	2	1	0	11.9	503.2	72	1
A5069	**15083**	4	1	0	12.2	515.4	73	0
A5069	**15084**	5	1	0	11.3	526.7	74	0
A5069	**15086**	7	1	0	12.7	539.4	75	1
A5069	**15087**	1	1	0	6	545.4	76	0
A5069	**15088**	2	1	0	12	557.4	77	0
A5069	**15090**	4	1	0	13.3	570.7	78	0
A5069	**15091**	5	1	0	13.5	584.2	79	0
A5069	**15092**	6	1	0	12.2	596.4	80	0
A5069	**15094**	8	1	0	12.4	608.8	81	0
A5069	**15095**	9	1	0	12.2	621	82	0
A5069	**15096**	10	1	0	12.6	633.6	83	0
A5069	**15098**	12	1	0	12.3	645.9	84	0
A5069	**15100**	14	1	0	14.9	660.8	85	0
A5069	**15102**	16	1	0	9	669.8	86	0
A5069	**15105**	19	1	0	11.8	681.6	87	0
A5069	**15106**	20	1	0	13.4	695	88	0
A5069	**15107**	21	1	0	12.2	707.2	89	0
A5069	**15109**	23	1	0	12.6	719.8	90	0
A5069	**15110**	24	1	0	12.5	732.3	91	0
A5069	**15112**	26	1	0	13	745.3	92	0
A5069	**15115**	29	1	0	12.4	757.7	93	0
A5069	**15119**	33	1	0	13.4	771.1	94	0
A5069	**15120**	34	1	0	12.3	783.4	95	0
A5069	**15122**	36	1	0	6.5	789.9	96	1
A5069	**15127**	5	1	0	11.9	801.8	97	0
A5069	**15129**	7	1	0	10.6	812.4	98	0
A5069	**15130**	8	1	0	13.3	825.7	99	0
A5069	**15132**	10	1	0	12.9	838.6	100	1
A5069	**15134**	2	1	0	11.8	850.4	101	1
A5069	**15135**	1	1	0	12.4	862.8	102	0
A5069	**15137**	3	1	0	13.1	875.9	103	0
A5069	**15139**	5	1	0	11.4	887.3	104	0
A5069	**15150**	16	1	0	12.6	899.9	105	0
A5069	**15152**	18	1	0	15.3	915.2	106	0
A5069	**15153**	19	1	0	6.6	921.8	107	0
A5069	**15154**	20	1	0	12.4	934.2	108	0

A5069	**15155**	21	1	0	10.1	944.3	109	0
A5069	**15157**	23	1	0	10.3	954.6	110	0
A5069	**15158**	24	1	0	12.5	967.1	111	0
A5069	**15160**	26	1	0	11.1	978.2	112	0
A5069	**15162**	28	1	0	12.7	990.9	113	1
A5069	**15164**	2	1	0	14.6	1005.5	114	0
A5069	**15166**	4	1	0	10	1015.5	115	1
A5069	**15167**	1	1	0	1	1016.5	116	1
A5069	**15168**	1	1	0	13.2	1029.7	117	0
A5069	**15169**	2	1	0	9.4	1039.1	118	0
A5069	**15171**	4	1	0	12.1	1051.2	119	0
A5069	**15173**	6	1	0	10.9	1062.1	120	0
A5069	**15175**	8	1	0	12.4	1074.5	121	0
A5069	**15184**	17	1	0	12.1	1086.6	122	0
A5069	**15186**	19	1	0	13.1	1099.7	123	0
A5069	**15188**	21	1	0	11.9	1111.6	124	0
A5069	**15192**	25	1	0	11.3	1122.9	125	0
A5069	**15194**	27	1	0	11	1133.9	126	0
A5069	**15196**	29	1	0	12.1	1146	127	1
A5069	**15197**	1	1	0	11.4	1157.4	128	1
A5069	**15199**	2	1	0	12.4	1169.8	129	0
A5069	**15201**	4	1	0	13.5	1183.3	130	0
A5069	**15203**	7	1	0	12.4	1195.7	131	0
A5069	**15205**	9	1	0	12.4	1208.1	132	0
A5069	**15206**	10	1	0	11.6	1219.7	133	1
A5069	**15211**	5	1	0	5.2	1224.9	134	1
A5069	**15217**	6	1	0	7.1	1232	135	1
A5069	**15218**	1	1	0	9	1241	136	1
A5069	**15221**	3	1	0	13.1	1254.1	137	1
A5069	**15222**	1	1	0	9.9	1264	138	0
A5069	**15223**	2	1	0	8.6	1272.6	139	0
A5069	**15225**	4	1	0	8.6	1281.2	140	0
A5069	**15226**	5	1	0	11	1292.2	141	0
A5069	**15228**	7	1	0	11.5	1303.7	142	0
A5069	**15229**	8	1	0	10.8	1314.5	143	0
A5069	**15230**	9	1	0	1.5	1316	144	1
A5069	**15234**	4	0	1	1	1317	145	1

A5069	**15243**	9	1	0	8.4	1325.4	146	0
A5069	**15249**	15	1	0	9.7	1335.1	147	0
A5069	**15250**	16	1	0	7.8	1342.9	148	0
A5069	**15251**	17	1	0	4.6	1347.5	149	0
A5069	**15252**	18	1	0	5.6	1353.1	150	1
A5069	**15254**	2	1	0	3.9	1357	151	0
A5069	**15258**	6	1	0	9	1366	152	0
A5069	**15259**	7	1	0	8.8	1374.8	153	1
A5069	**15260**	1	1	0	1.1	1375.9	154	1
A5069	**15262**	2	1	0	8.2	1384.1	155	0
A5069	**15265**	5	0	1	9.1	1393.2	156	0
A5069	**15265**	5	0	1	10.3	1403.5	157	1
A5069	**16106**	206	0	1	1.1	1404.6	158	1
A5069	**16166**	60	0	0	3.2	1407.8	159	1
A5069	**16168**	2	0	0	4	1411.8	160	1
A5069	**16195**	27	0	0	2.9	1414.7	161	0
A5069	**16195**	27	0	0	2.7	1417.4	162	1
A5069	**16197**	2	0	0	2.8	1420.2	163	0
A5069	**16197**	2	0	0	1.6	1421.8	164	1
A5069	**16208**	11	0	0	3.7	1425.5	165	1
A5069	**16210**	2	0	0	3.1	1428.6	166	1
A5069	**16210**	0	0	0	2	1430.6	167	1
A5069	**16239**	29	0	0	5	1435.6	169	0
A5069	**16244**	34	0	0	3.2	1438.8	170	1
A5069	**16252**	8	0	0	1.6	1440.4	171	1
A5069	**16266**	14	0	0	8.7	1449.1	174	0
A5069	**16270**	18	0	0	5.3	1454.4	175	0
A5069	**16306**	54	0	0	1.6	1456	176	1
A5072	**14106**	1	0	0	4.2	4.2	1	1
A5072	**14133**	28	0	0	6	10.2	2	1
A5072	**14148**	15	0	0	8.3	18.5	4	0
A5072	**14148**	15	0	0	2	20.5	5	1
A5072	**14154**	6	0	1	15.6	36.1	6	0
A5072	**14157**	9	1	0	6.5	42.6	7	1
A5072	**14159**	2	1	0	10.5	53.1	8	1
A5072	**14161**	2	1	0	11.5	64.6	9	1
A5072	**14163**	2	1	0	12.1	76.7	10	0

A5072	**14164**	3	1	0	12.1	88.8	11	1
A5072	**14166**	2	1	0	12.2	101	12	0
A5072	**14177**	13	1	0	17.9	118.9	13	1
A5072	**14183**	6	0	0	7.7	126.6	15	0
A5072	**14189**	12	0	0	4	130.6	16	0
A5072	**14189**	12	0	0	1.7	132.3	17	1
A5072	**14203**	14	0	0	6.7	139	19	0
A5072	**14204**	15	0	0	1.3	140.3	20	0
A5072	**14211**	22	0	0	8	148.3	22	0
A5072	**14211**	22	0	0	2.2	150.5	23	1
A5072	**14230**	19	0	0	1.7	152.2	24	1
A5072	**14232**	2	0	0	1.4	153.6	25	1
A5072	**14252**	20	0	0	2.1	155.7	26	0
A5072	**14252**	20	0	0	3	158.7	27	1
A5072	**14281**	29	0	0	3	161.7	28	1
A5072	**14283**	2	0	0	2.1	163.8	29	0
A5072	**14283**	2	0	0	2.3	166.1	30	1
A5072	**14307**	1	0	0	4.4	170.5	31	1
A5072	**14310**	3	0	0	4.7	175.2	32	0
A5072	**14317**	10	0	0	1.6	176.8	33	1
A5072	**14324**	7	0	0	5.3	182.1	34	1
A5072	**14338**	14	0	0	3	185.1	36	0
A5072	**14338**	14	0	0	2.9	188	37	1
A5072	**15005**	32	0	0	3.4	191.4	39	0
A5072	**15007**	34	0	0	2.1	193.5	40	1
A5072	**15014**	7	0	0	4.7	198.2	41	1
A5072	**15016**	2	0	0	5.6	203.8	42	1
A5072	**15029**	13	0	0	3	206.8	43	0
A5072	**15054**	38	0	0	7.3	214.1	45	0
A5072	**15054**	38	0	0	1.9	216	46	1
A5072	**15065**	12	0	0	3.4	219.4	47	1
A5072	**15068**	3	0	0	3.1	222.5	48	0
A5072	**15069**	4	0	0	3.1	225.6	49	1
A5072	**15072**	3	0	0	3.8	229.4	50	0
A5072	**15091**	22	0	0	4.8	234.2	51	1
A5072	**15093**	2	0	0	1.6	235.8	52	0
A5072	**15097**	6	0	1	16.4	252.2	53	0

A5072	**15101**	10	1	0	12.3	264.5	54	0
A5072	**15104**	13	1	0	13.2	277.7	55	0
A5072	**15107**	16	1	0	11.8	289.5	56	0
A5072	**15108**	17	1	0	13.1	302.6	57	0
A5072	**15110**	19	1	0	14.1	316.7	58	0
A5072	**15112**	21	1	0	11.5	328.8	59	0
A5072	**15114**	23	1	0	11.8	340	60	0
A5072	**15116**	25	1	0	12.2	352.2	61	1
A5072	**15118**	2	1	0	12.2	364.4	62	0
A5072	**15119**	3	1	0	12.6	377	63	0
A5072	**15120**	4	1	0	12	389	64	0
A5072	**15121**	5	1	0	12.9	401.9	65	1
A5072	**15132**	11	1	0	11.9	413.8	66	0
A5072	**15136**	15	1	0	12.1	425.9	67	0
A5072	**15138**	17	1	0	10.5	436.4	68	0
A5072	**15139**	18	1	0	10.1	446.5	69	0
A5072	**15141**	20	1	0	12	458.5	70	0
A5072	**15143**	22	1	0	12.8	471.3	71	0
A5072	**15144**	23	1	0	11.3	482.6	72	1
A5072	**15146**	2	1	0	11.2	493.8	73	1
A5072	**15147**	1	1	0	10.7	504.5	74	1
A5072	**15156**	9	1	0	12.2	516.7	75	0
A5072	**15158**	11	1	0	12.3	529	76	1
A5072	**15159**	1	1	0	1	530	77	1
A5072	**15161**	2	1	0	10.5	540.5	78	0
A5072	**15162**	3	1	0	11.9	552.4	79	1
A5072	**15164**	2	1	0	11.3	563.7	80	0
A5072	**15165**	3	1	0	12.4	576.1	81	0
A5072	**15167**	5	1	0	13.8	589.9	82	0
A5072	**15168**	6	1	0	12	601.9	83	0
A5072	**15169**	7	1	0	11.1	613	84	0
A5072	**15171**	8	1	0	10.9	623.9	85	0
A5072	**15175**	12	1	0	11.1	635	86	0
A5072	**15184**	21	1	0	12.1	647.1	87	0
A5072	**15186**	23	1	0	11.5	658.6	88	1
A5072	**15193**	7	1	0	11.3	669.9	89	0
A5072	**15195**	9	1	0	13.3	683.2	90	1

A5072	**15199**	4	1	0	1.2	684.4	91	1
A5072	**15209**	10	0	1	18.7	703.1	92	1
A5072	**15227**	18	0	0	2.4	705.5	93	1
A5072	**15279**	52	0	0	4.2	709.7	95	0
A5072	**15281**	54	0	0	6.9	716.6	97	0
A5072	**15281**	54	0	0	2.2	718.8	98	1
A5072	**15289**	8	0	0	3.1	721.9	99	0
A5072	**15293**	12	0	0	5	726.9	100	0
A5072	**15294**	13	0	0	4.8	731.7	101	0
A5072	**15296**	15	0	0	3.5	735.2	102	0
A5072	**15307**	26	0	0	2.7	737.9	103	0
A5072	**15307**	26	0	0	2.3	740.2	104	1
A5072	**15309**	2	0	0	7.3	747.5	106	0
A5072	**15335**	38	0	0	3.4	750.9	107	1
A5072	**16020**	51	0	0	4.4	755.3	108	0
A5072	**16020**	51	0	0	3.6	758.9	109	1
A5072	**16032**	12	0	0	10.2	769.1	111	0
A5072	**16034**	14	0	0	3.5	772.6	112	1
A5072	**16048**	14	0	0	8.3	780.9	115	0
A5072	**16050**	16	0	0	4.3	785.2	117	0
A5072	**16056**	22	0	0	5.4	790.6	118	0
A5072	**16060**	26	0	0	5.7	796.3	120	0
A5072	**16098**	64	0	0	6.1	802.4	121	0
A5072	**16101**	67	0	0	3.1	805.5	122	1
A5072	**16101**	0	0	0	3.2	808.7	123	1
A5072	**16102**	1	0	0	6.2	814.9	125	0
A5072	**16103**	2	0	0	3.6	818.5	126	0
A5072	**16104**	3	0	0	5.5	824	128	0
A5072	**16105**	4	0	0	2.2	826.2	129	0
A5072	**16106**	5	0	0	2.8	829	130	0
A5072	**16108**	7	0	0	6.1	835.1	132	0
A5072	**16109**	8	0	0	3.3	838.4	133	1
A5072	**16109**	1	0	0	2.7	841.1	134	0
A5072	**16110**	2	0	0	5	846.1	136	0
A5072	**16111**	3	0	0	2.9	849	137	1
A5072	**16112**	1	0	0	6.5	855.5	139	0
A5072	**16113**	2	0	0	3.5	859	140	0

A5072	**16153**	42	0	0	8.9	867.9	143	0
A5072	**16155**	44	0	0	5.2	873.1	145	0
A5072	**16159**	48	0	0	4	877.1	146	0
A5072	**16159**	48	0	0	1.8	878.9	147	1
A5072	**16161**	2	0	0	4.1	883	148	0
A5072	**16161**	2	0	0	2.9	885.9	149	1
A5072	**16165**	4	0	0	1.8	887.7	150	0
A5072	**16167**	6	0	0	9.9	897.6	153	0
A5072	**16169**	8	0	0	4.6	902.2	155	0
A5072	**16180**	19	0	0	2.9	905.1	156	0
A5072	**16180**	19	0	0	2.2	907.3	157	1
A5072	**16187**	7	0	0	7.1	914.4	160	0
A5072	**16189**	9	0	0	3.7	918.1	162	0
A5072	**16194**	14	0	0	2	920.1	163	0
A5072	**16196**	16	0	0	5.2	925.3	165	0
A5072	**16201**	21	0	0	2.9	928.2	166	0
A5072	**16201**	22	0	0	2.7	930.9	167	1
A5072	**16231**	30	0	0	4.2	935.1	168	1
A5079	**13276**	1	0	0	3.1	3.1	1	1
A5079	**13295**	20	0	1	2.4	5.5	2	1
A5079	**13305**	10	0	0	3.8	9.3	4	0
A5079	**13309**	14	0	0	3.4	12.7	5	1
A5079	**13311**	2	0	0	2.6	15.3	6	0
A5079	**13311**	2	0	0	5.1	20.4	7	1
A5079	**13340**	29	0	0	2.8	23.2	8	1
A5079	**13350**	10	0	0	4.3	27.5	9	0
A5079	**13352**	12	0	0	1.9	29.4	10	1
A5079	**14008**	21	0	0	1.7	31.1	11	0
A5079	**14013**	26	0	0	6.3	37.4	13	0
A5079	**14013**	26	0	0	3.1	40.5	14	1
A5079	**14050**	37	0	0	7.2	47.7	15	0
A5079	**14050**	37	0	0	1.7	49.4	16	1
A5079	**14052**	2	0	0	2.2	51.6	17	1
A5079	**14056**	4	0	0	4	55.6	18	0
A5079	**14056**	4	0	0	3.6	59.2	19	1
A5079	**14059**	3	0	0	4.5	63.7	21	0
A5079	**14076**	20	0	0	2.6	66.3	22	0

A5079	**14076**	20	0	0	1.7	68	23	1
A5079	**14078**	2	0	0	5.7	73.7	25	0
A5079	**14079**	3	0	0	5.8	79.5	26	0
A5079	**14079**	3	0	0	2.7	82.2	27	1
A5079	**14083**	4	0	0	7	89.2	30	0
A5079	**14085**	6	0	0	3.9	93.1	31	1
A5079	**14094**	9	0	0	1.9	95	32	1
A5079	**14099**	6	0	0	3.5	98.5	33	1
A5079	**14101**	2	0	0	4.1	102.6	34	0
A5079	**14104**	5	0	0	7.7	110.3	36	0
A5079	**14106**	7	0	0	3.9	114.2	37	1
A5079	**14106**	0	0	0	2	116.2	38	1
A5079	**14108**	2	0	0	3.6	119.8	39	0
A5079	**14112**	6	0	0	8.3	128.1	41	0
A5079	**14114**	8	0	0	9.1	137.2	43	0
A5079	**14118**	12	0	0	4.1	141.3	44	0
A5079	**14120**	14	0	0	8.4	149.7	46	0
A5079	**14170**	64	0	0	11.1	160.8	48	0
A5079	**14176**	70	0	0	6.4	167.2	50	0
A5079	**14178**	72	0	0	3.6	170.8	52	0
A5079	**14196**	80	0	0	6	176.8	54	0
A5079	**14197**	81	0	0	7.3	184.1	56	0
A5079	**14198**	82	0	0	7.9	192	58	0
A5079	**14251**	145	0	0	1.7	193.7	59	1
A5079	**14253**	2	0	0	7.3	201	60	1
A5079	**14266**	13	0	0	3.8	204.8	61	1
A5079	**14268**	2	0	0	3.1	207.9	62	0
A5079	**14275**	9	0	0	9.8	217.7	64	0
A5079	**14288**	22	0	0	8.3	226	66	0
A5079	**14290**	24	0	0	5.4	231.4	67	0
A5079	**14301**	35	1	0	16.6	248	68	0
A5079	**14303**	37	1	0	12.8	260.8	69	1
A5079	**14307**	4	1	0	14.4	275.2	70	0
A5079	**14308**	5	1	0	11.2	286.4	71	1
A5079	**14310**	2	1	0	11.2	297.6	72	0
A5079	**14312**	4	1	0	12.6	310.2	73	0
A5079	**14313**	5	1	0	13.3	323.5	74	0

A5079	**14314**	6	1	0	11.6	335.1	75	1
A5079	**14316**	2	1	0	13.6	348.7	76	1
A5079	**14320**	4	1	0	11.8	360.5	77	0
A5079	**14321**	5	1	0	6.2	366.7	78	0
A5079	**14323**	7	1	0	12.3	379	79	0
A5079	**14324**	8	1	0	11.9	390.9	80	0
A5079	**14326**	10	1	0	9.8	400.7	81	0
A5079	**14327**	11	1	0	13.7	414.4	82	0
A5079	**14328**	12	1	0	13.5	427.9	83	1
A5079	**14331**	3	1	0	11.4	439.3	84	0
A5079	**14332**	4	1	0	11.7	451	85	0
A5079	**14334**	6	1	0	12.7	463.7	86	1
A5079	**14335**	1	1	0	11.4	475.1	87	1
A5079	**14336**	1	1	0	11.7	486.8	88	1
A5079	**14338**	2	1	0	12.4	499.2	89	1
A5079	**14346**	8	1	0	16.6	515.8	90	1
A5079	**14348**	2	1	0	13.1	528.9	91	0
A5079	**14350**	4	1	0	4.9	533.8	92	1
A5079	**14352**	2	1	0	1.8	535.6	93	1
A5079	**14354**	2	1	0	12.6	548.2	94	0
A5079	**14355**	3	1	0	13	561.2	95	0
A5079	**14356**	4	1	0	12.3	573.5	96	0
A5079	**14357**	5	1	0	12	585.5	97	0
A5079	**14358**	6	1	0	13.1	598.6	98	0
A5079	**14360**	8	1	0	11.7	610.3	99	1
A5079	**14361**	1	1	0	12.9	623.2	100	0
A5079	**14363**	3	1	0	8.8	632	101	1
A5079	**15003**	5	1	0	13.9	645.9	102	1
A5079	**15004**	1	1	0	11.3	657.2	103	0
A5079	**15005**	2	1	0	9.3	666.5	104	0
A5079	**15008**	5	1	0	12.3	678.8	105	1
A5079	**15013**	5	1	0	13	691.8	106	0
A5079	**15014**	6	1	0	12.4	704.2	107	1
A5079	**15020**	6	1	0	11.9	716.1	108	0
A5079	**15021**	7	1	0	12.2	728.3	109	0
A5079	**15023**	9	1	0	13	741.3	110	1
A5079	**15025**	2	1	0	11.3	752.6	111	1

A5079	**15025**	0	1	0	12.8	765.4	112	1
A5079	**15029**	4	1	0	12.8	778.2	113	0
A5079	**15030**	5	1	0	12.8	791	114	0
A5079	**15031**	6	1	0	11	802	115	0
A5079	**15042**	17	1	0	11.7	813.7	116	0
A5079	**15044**	19	1	0	11.6	825.3	117	0
A5079	**15045**	20	1	0	11.8	837.1	118	1
A5079	**15048**	3	1	0	12.8	849.9	119	0
A5079	**15050**	5	1	0	9.7	859.6	120	1
A5079	**15051**	1	1	0	1.5	861.1	121	1
A5079	**15052**	1	1	0	11.2	872.3	122	0
A5079	**15053**	2	1	0	10.8	883.1	123	1
A5079	**15055**	2	1	0	12.4	895.5	124	0
A5079	**15060**	7	1	0	13.9	909.4	125	0
A5079	**15063**	10	1	0	12.5	921.9	126	0
A5079	**15065**	12	1	0	11	932.9	127	1
A5079	**15074**	9	1	0	1.2	934.1	128	1
A5079	**15075**	1	1	0	12.3	946.4	129	0
A5079	**15077**	3	1	0	13.2	959.6	130	0
A5079	**15078**	4	1	0	14.3	973.9	131	0
A5079	**15080**	6	1	0	11.1	985	132	0
A5079	**15082**	8	1	0	12.9	997.9	133	1
A5079	**15083**	1	1	0	9	1006.9	134	0
A5079	**15085**	3	1	0	11.7	1018.6	135	0
A5079	**15086**	4	1	0	11.5	1030.1	136	0
A5079	**15087**	5	1	0	12.1	1042.2	137	0
A5079	**15088**	6	1	0	12.7	1054.9	138	1
A5079	**15089**	1	1	0	12.9	1067.8	139	0
A5079	**15091**	3	1	0	11.7	1079.5	140	1
A5079	**15092**	1	1	0	1.2	1080.7	141	1
A5079	**15109**	17	0	1	18.7	1099.4	142	1
A5079	**15224**	15	0	0	3.5	1102.9	144	0
A5079	**15227**	17	0	0	4	1106.9	145	1
A5079	**15239**	12	0	0	10.1	1117	147	0
A5079	**15243**	16	0	0	9.4	1126.4	149	0
A5079	**15245**	18	0	0	9.8	1136.2	151	0
A5079	**15252**	85	0	0	8.5	1144.7	153	0

A5079	**15254**	87	0	0	3.9	1148.6	154	1
A5079	**15268**	14	0	0	3.1	1151.7	155	1
A5079	**15280**	12	0	0	4.1	1155.8	156	0
A5079	**15280**	12	0	0	3.5	1159.3	157	1
A5079	**15287**	7	0	0	5.3	1164.6	158	1
A5079	**15293**	6	0	0	4.8	1169.4	159	0
A5079	**15299**	12	0	0	9.1	1178.5	161	0
A5079	**15301**	14	0	0	9.2	1187.7	163	0
A5079	**15306**	19	0	0	8.3	1196	166	0
A5079	**15310**	23	0	0	3.1	1199.1	167	0
A5079	**15310**	23	0	0	2.1	1201.2	168	1
A5079	**15345**	35	0	0	2.9	1204.1	169	0
A5079	**15355**	45	0	0	3.8	1207.9	170	0
A5079	**15355**	45	0	0	3.9	1211.8	171	1
A5079	**16005**	15	0	0	6.9	1218.7	173	0
A5079	**16019**	29	0	0	3.5	1222.2	174	1
A5079	**16021**	2	0	0	2.2	1224.4	175	0
A5079	**16021**	3	0	0	2.8	1227.2	176	1
A5079	**16029**	8	0	0	2.2	1229.4	177	1
A5079	**16035**	6	0	0	8.5	1237.9	179	0
A5079	**16047**	18	0	0	1.6	1239.5	180	0
A5079	**16049**	20	0	0	5.3	1244.8	182	0
A5079	**16056**	27	0	0	4	1248.8	183	0
A5079	**16113**	84	0	0	2.7	1251.5	184	1
A5079	**16118**	5	0	0	0.5	1252	185	1
A5081	**13281**	1	0	0	3.6	3.6	1	0
A5081	**13283**	3	0	0	2.8	6.4	2	0
A5081	**13288**	8	0	0	3.2	9.6	3	0
A5081	**13290**	10	0	0	3.1	12.7	4	0
A5081	**13290**	10	0	0	3.3	16	5	1
A5081	**13317**	27	0	0	3.8	19.8	6	0
A5081	**13317**	27	0	0	3.5	23.3	7	1
A5081	**13322**	5	0	0	3	26.3	8	0
A5081	**13324**	7	0	0	6.6	32.9	10	0
A5081	**13326**	9	0	0	4	36.9	12	0
A5081	**13336**	19	0	0	4.7	41.6	14	0
A5081	**13350**	33	0	0	7.9	49.5	17	0

A5081	**13352**	35	0	0	3.9	53.4	18	1
A5081	**14009**	22	0	0	2.3	55.7	19	1
A5081	**14035**	26	0	0	7.9	63.6	20	0
A5081	**14042**	33	0	0	6.1	69.7	21	0
A5081	**14044**	35	0	0	7.8	77.5	23	0
A5081	**14049**	40	0	0	8.7	86.2	24	1
A5081	**14052**	3	0	0	2.4	88.6	25	0
A5081	**14055**	6	0	0	3.9	92.5	26	1
A5081	**14057**	2	0	0	4	96.5	27	1
A5081	**14071**	14	0	0	9.7	106.2	29	0
A5081	**14076**	19	0	0	4.7	110.9	30	1
A5081	**14078**	2	0	0	9.8	120.7	32	0
A5081	**14080**	4	0	0	4.5	125.2	33	0
A5081	**14084**	8	0	0	10.8	136	36	0
A5081	**14086**	10	0	0	10	146	38	0
A5081	**14091**	15	0	0	3	149	39	0
A5081	**14091**	15	0	0	2.7	151.7	40	1
A5081	**14104**	3	0	0	4.2	155.9	41	1
A5081	**14106**	2	0	0	4.1	160	42	1
A5081	**14189**	83	0	0	9	169	44	0
A5081	**14192**	86	0	0	4.8	173.8	45	0
A5081	**14196**	90	0	0	2.7	176.5	46	1
A5081	**14196**	0	0	0	1.2	177.7	47	1
A5081	**14205**	9	0	0	4.9	182.6	49	0
A5081	**14206**	10	0	0	4.5	187.1	51	0
A5081	**14217**	21	0	0	8	195.1	53	0
A5081	**14219**	23	0	0	5.4	200.5	54	1
A5081	**14226**	7	0	0	6.4	206.9	56	0
A5081	**14228**	9	0	0	3.4	210.3	57	0
A5081	**14231**	12	0	0	4.9	215.2	59	0
A5081	**14231**	12	0	0	2.3	217.5	60	1
A5081	**15065**	200	0	0	0.5	218	61	1
A5081	**15071**	6	0	0	4	222	62	0
A5081	**15089**	24	0	0	4.3	226.3	63	0
A5081	**15090**	25	0	0	2.7	229	64	0
A5081	**15092**	27	0	0	5.1	234.1	65	1
A5081	**15097**	5	0	1	16.4	250.5	66	1

A5081	**15101**	4	1	0	1.4	251.9	67	1
A5081	**15103**	2	1	0	13	264.9	68	0
A5081	**15105**	4	1	0	12.7	277.6	69	1
A5081	**15109**	4	1	0	12.5	290.1	70	0
A5081	**15113**	8	1	0	12	302.1	71	0
A5081	**15115**	10	1	0	13.2	315.3	72	0
A5081	**15117**	12	1	0	12.1	327.4	73	1
A5081	**15119**	2	1	0	11.9	339.3	74	1
A5081	**15121**	2	1	0	11.6	350.9	75	0
A5081	**15122**	3	1	0	11.2	362.1	76	0
A5081	**15124**	5	1	0	12.5	374.6	77	0
A5081	**15125**	6	1	0	11.8	386.4	78	0
A5081	**15126**	7	1	0	11.2	397.6	79	0
A5081	**15127**	8	1	0	11.5	409.1	80	1
A5081	**15129**	2	1	0	1.1	410.2	81	1
A5081	**15130**	1	1	0	10.9	421.1	82	0
A5081	**15131**	2	1	0	13.1	434.2	83	0
A5081	**15133**	4	1	0	11.2	445.4	84	0
A5081	**15134**	5	1	0	12.5	457.9	85	0
A5081	**15136**	7	1	0	11.9	469.8	86	0
A5081	**15137**	8	1	0	12.1	481.9	87	1
A5081	**15139**	2	1	0	12.7	494.6	88	0
A5081	**15140**	3	1	0	3.4	498	89	1
A5081	**15142**	2	1	0	13.4	511.4	90	1
A5081	**15143**	1	1	0	13	524.4	91	0
A5081	**15144**	2	1	0	10.2	534.6	92	1
A5081	**15146**	2	1	0	6.7	541.3	93	1
A5081	**15147**	1	1	0	12.3	553.6	94	0
A5081	**15149**	3	1	0	11.2	564.8	95	0
A5081	**15150**	4	1	0	13.1	577.9	96	0
A5081	**15151**	5	1	0	12.3	590.2	97	0
A5081	**15152**	6	1	0	10.8	601	98	1
A5081	**15161**	9	1	0	11.6	612.6	99	0
A5081	**15163**	11	1	0	13	625.6	100	0
A5081	**15165**	13	1	0	9.2	634.8	101	1
A5081	**15187**	22	1	0	12	646.8	102	1
A5081	**15190**	3	1	0	11.9	658.7	103	1

A5081	**15194**	4	1	0	12.8	671.5	104	0
A5081	**15196**	6	1	0	11.1	682.6	105	0
A5081	**15198**	8	1	0	14.3	696.9	106	0
A5081	**15201**	11	1	0	11.8	708.7	107	0
A5081	**15203**	13	1	0	13.8	722.5	108	0
A5081	**15204**	14	1	0	13.1	735.6	109	1
A5081	**15206**	2	1	0	12.4	748	110	0
A5081	**15209**	5	0	1	18.7	766.7	111	1
A5081	**15231**	22	0	0	3	769.7	112	0
A5081	**15244**	35	0	0	1.9	771.6	113	1
A5081	**15253**	9	0	0	5.2	776.8	114	0
A5081	**15253**	9	0	0	5.1	781.9	115	1
A5081	**15323**	70	0	0	1.5	783.4	116	1
A5081	**15327**	4	0	0	3.7	787.1	117	1
A5081	**15329**	2	0	0	2.7	789.8	118	0
A5081	**15334**	7	0	0	5.5	795.3	120	0
A5081	**15336**	9	0	0	4	799.3	121	0
A5081	**15341**	14	0	0	4.3	803.6	122	1
A5081	**15345**	4	0	0	5.3	808.9	124	0
A5081	**15351**	10	0	0	3.2	812.1	125	1
A5081	**15351**	0	0	0	1	813.1	126	0
A5081	**15355**	4	0	0	3.6	816.7	127	0
A5081	**15356**	5	0	0	3.7	820.4	128	1
A5081	**16019**	28	0	0	3.6	824	129	0
A5081	**16021**	30	0	0	3.1	827.1	130	0
A5081	**16026**	35	0	0	6.5	833.6	131	1
A5081	**16028**	2	0	0	9	842.6	133	0
A5081	**16034**	8	0	0	6	848.6	134	0
A5081	**16036**	10	0	0	2.9	851.5	135	0
A5081	**16040**	14	0	0	8.3	859.8	137	0
A5081	**16042**	16	0	0	6.2	866	139	0
A5081	**16047**	21	0	0	6.2	872.2	141	0
A5081	**16049**	23	0	0	3.1	875.3	142	0
A5081	**16049**	23	0	0	3.1	878.4	143	1
A5083	**13354**	1	0	0	1.8	1.8	1	0
A5083	**14016**	28	0	0	4.6	6.4	3	0
A5083	**14021**	33	0	0	2.9	9.3	4	1

A5083	**14023**	2	0	0	4.2	13.5	5	1
A5083	**14028**	5	0	0	4.7	18.2	6	0
A5083	**14028**	5	0	0	3.4	21.6	7	1
A5083	**14042**	14	0	0	8.3	29.9	8	0
A5083	**14044**	16	0	0	3.2	33.1	9	1
A5083	**14049**	5	0	0	8.6	41.7	10	0
A5083	**14051**	7	0	0	8.2	49.9	11	1
A5083	**14051**	0	0	0	2	51.9	12	0
A5083	**14055**	4	0	0	2.7	54.6	13	1
A5083	**14057**	2	0	0	2.8	57.4	14	0
A5083	**14057**	2	0	0	3.6	61	15	1
A5083	**14063**	6	0	0	1.7	62.7	16	1
A5083	**14065**	2	0	0	4	66.7	17	0
A5083	**14065**	2	0	0	2.9	69.6	18	1
A5083	**14069**	4	0	0	8.9	78.5	21	0
A5083	**14070**	5	0	0	5	83.5	22	1
A5083	**14072**	2	0	0	10.8	94.3	25	0
A5083	**14077**	7	0	0	16.7	111	26	0
A5083	**14079**	9	1	0	12.8	123.8	27	0
A5083	**14080**	10	1	0	12.6	136.4	28	0
A5083	**14081**	11	1	0	12.2	148.6	29	0
A5083	**14083**	13	1	0	2	150.6	30	1
A5083	**14084**	1	1	0	11.6	162.2	31	0
A5083	**14086**	3	1	0	12.8	175	32	1
A5083	**14087**	1	1	0	13.7	188.7	33	0
A5083	**14090**	4	1	0	12.9	201.6	34	0
A5083	**14091**	5	1	0	11.7	213.3	35	0
A5083	**14092**	6	1	0	12.2	225.5	36	0
A5083	**14093**	7	1	0	11.9	237.4	37	0
A5083	**14095**	9	1	0	9.2	246.6	38	0
A5083	**14096**	10	1	0	11.7	258.3	39	0
A5083	**14097**	11	1	0	12	270.3	40	0
A5083	**14099**	13	1	0	11.8	282.1	41	0
A5083	**14101**	15	1	0	11.8	293.9	42	0
A5083	**14102**	16	1	0	11.9	305.8	43	0
A5083	**14103**	17	1	0	12	317.8	44	0
A5083	**14104**	18	1	0	12	329.8	45	0

A5083	**14105**	19	1	0	12.8	342.6	46	0
A5083	**14106**	20	1	0	12	354.6	47	0
A5083	**14107**	21	1	0	12.4	367	48	1
A5083	**14109**	2	1	0	12	379	49	0
A5083	**14110**	3	1	0	12.7	391.7	50	0
A5083	**14111**	4	1	0	12.2	403.9	51	0
A5083	**14113**	6	1	0	13	416.9	52	1
A5083	**14115**	2	1	0	12.5	429.4	53	1
A5083	**14116**	1	1	0	12.1	441.5	54	0
A5083	**14118**	3	1	0	11.8	453.3	55	0
A5083	**14119**	4	1	0	10.5	463.8	56	0
A5083	**14120**	5	1	0	12.4	476.2	57	1
A5083	**14121**	1	1	0	12.5	488.7	58	0
A5083	**14123**	3	1	0	12	500.7	59	0
A5083	**14124**	4	1	0	12.9	513.6	60	0
A5083	**14125**	5	1	0	9.3	522.9	61	0
A5083	**14126**	6	1	0	7.7	530.6	62	1
A5083	**14132**	6	1	0	12.7	543.3	63	0
A5083	**14133**	7	1	0	12.7	556	64	0
A5083	**14135**	9	1	0	12.4	568.4	65	0
A5083	**14136**	10	1	0	13	581.4	66	0
A5083	**14138**	12	1	0	12.3	593.7	67	0
A5083	**14140**	14	1	0	13.2	606.9	68	0
A5083	**14142**	16	1	0	12.4	619.3	69	0
A5083	**14143**	17	1	0	12.7	632	70	1
A5083	**14145**	2	1	0	13.4	645.4	71	1
A5083	**14146**	1	1	0	12.2	657.6	72	0
A5083	**14147**	2	1	0	13.3	670.9	73	0
A5083	**14149**	4	1	0	12	682.9	74	0
A5083	**14150**	5	1	0	8.8	691.7	75	1
A5083	**14152**	2	1	0	11.6	703.3	76	0
A5083	**14153**	3	1	0	13.4	716.7	77	0
A5083	**14155**	5	1	0	12.1	728.8	78	0
A5083	**14158**	8	1	0	12.7	741.5	79	0
A5083	**14162**	13	1	0	12.3	753.8	80	0
A5083	**14163**	14	1	0	12.7	766.5	81	0
A5083	**14165**	16	1	0	12.7	779.2	82	0

A5083	**14166**	17	1	0	12.1	791.3	83	0
A5083	**14167**	18	1	0	12.3	803.6	84	0
A5083	**14168**	19	1	0	12.9	816.5	85	1
A5083	**14169**	1	1	0	14.1	830.6	86	0
A5083	**14170**	2	1	0	13.4	844	87	0
A5083	**14171**	3	1	0	12.7	856.7	88	1
A5083	**14173**	2	1	0	11.9	868.6	89	0
A5083	**14175**	4	1	0	11.6	880.2	90	0
A5083	**14181**	10	1	0	11.9	892.1	91	0
A5083	**14182**	11	1	0	15.1	907.2	92	0
A5083	**14183**	12	1	0	11.3	918.5	93	0
A5083	**14185**	14	1	0	11.1	929.6	94	1
A5083	**14191**	5	1	0	11.8	941.4	95	0
A5083	**14192**	6	1	0	11.6	953	96	0
A5083	**14194**	8	1	0	12.4	965.4	97	0
A5083	**14195**	9	1	0	12.7	978.1	98	0
A5083	**14196**	10	1	0	12.3	990.4	99	0
A5083	**14198**	12	1	0	12.3	1002.7	100	0
A5083	**14199**	13	1	0	11.6	1014.3	101	0
A5083	**14201**	15	1	0	12	1026.3	102	0
A5083	**14205**	19	0	1	17.5	1043.8	103	0
A5083	**14223**	37	0	0	3.3	1047.1	104	1
A5083	**14227**	4	0	0	2.2	1049.3	105	0
A5083	**14227**	4	0	0	1.6	1050.9	106	1
A5083	**14280**	53	0	0	4.4	1055.3	107	1
A5083	**14302**	22	0	0	9.5	1064.8	109	0
A5083	**14304**	24	0	0	4.1	1068.9	111	0
A5083	**14308**	28	0	0	4.7	1073.6	112	0
A5083	**14308**	28	0	0	2.6	1076.2	113	1
A5083	**14310**	2	0	0	4.8	1081	114	0
A5083	**14313**	5	0	0	2.5	1083.5	115	0
A5083	**14313**	6	0	0	3.2	1086.7	116	1
A5083	**14315**	2	0	0	2.9	1089.6	117	0
A5083	**14316**	3	0	0	2.9	1094.9	119	0
A5083	**14317**	4	0	0	3	1097.9	120	0
A5083	**14319**	6	0	0	2.9	1100.8	121	0
A5083	**14321**	8	0	0	5.5	1106.3	123	0

A5083	**14322**	9	0	0	5.6	1111.9	125	0
A5083	**14323**	10	0	0	2.1	1114	126	1
A5083	**14325**	2	0	0	3.9	1117.9	127	1
A5083	**14329**	4	0	0	2.6	1120.5	128	1
A5083	**14337**	8	0	0	5.5	1126	130	0
A5083	**14337**	9	0	0	2.7	1128.7	131	1
A5083	**14339**	2	0	0	3.3	1132	132	0
A5083	**14343**	6	0	0	9.3	1141.3	135	0
A5083	**14345**	8	0	0	7.2	1148.5	138	0
A5083	**15005**	34	0	0	2.3	1150.8	139	0
A5083	**15008**	37	0	0	1.5	1152.3	140	0
A5083	**15021**	50	0	0	10.2	1162.5	143	0
A5083	**15023**	52	0	0	4.2	1166.7	145	0
A5083	**15028**	57	0	0	3.2	1169.9	146	1
A5083	**15040**	2	0	0	8.2	1178.1	147	1
A5083	**15041**	1	0	0	7.3	1185.4	148	0
A5083	**15043**	3	0	0	8.3	1193.7	150	0
A5083	**15048**	8	0	0	3.3	1197	151	0
A5083	**15048**	8	0	0	2.2	1199.2	152	1
A5083	**15055**	7	0	0	1.7	1200.9	153	1
A5083	**15085**	30	0	0	4.5	1205.4	154	1
A5083	**15089**	4	0	0	4.6	1210	155	0
A5083	**15090**	5	0	0	5	1215	156	0
A5083	**15092**	7	0	0	9.9	1224.9	158	0
A5083	**15097**	12	0	0	6.9	1231.8	159	0
A5083	**15099**	14	0	0	4.4	1236.2	160	0
A5083	**15099**	15	0	0	2.5	1238.7	161	1
A5083	**15099**	0	0	0	1	1239.7	162	1
A5083	**15110**	11	0	0	8.5	1248.2	164	0
A5083	**15112**	13	0	0	9.6	1257.8	167	0
A5083	**15116**	18	0	0	11.7	1269.5	169	0
A5083	**15118**	20	0	0	4.7	1274.2	170	0
A5083	**15120**	22	0	0	6.3	1280.5	171	0
A5083	**15121**	23	0	0	6.1	1286.6	172	0
A5083	**15123**	25	0	0	11.5	1298.1	174	0
A5083	**15125**	27	0	0	10.6	1308.7	176	0
A5083	**15126**	28	0	0	9.8	1318.5	178	0

A5083	**15128**	30	0	0	6.3	1324.8	179	0
A5083	**15198**	100	0	0	3	1327.8	180	1
A5083	**15230**	32	0	0	6.1	1333.9	182	0
A5083	**15232**	34	0	0	2.1	1336	183	0
A5083	**15232**	34	0	0	3.7	1339.7	184	1
A5083	**15245**	13	0	0	3.5	1343.2	185	0
A5083	**15252**	20	0	0	7.6	1350.8	187	0
A5083	**15254**	22	0	0	5.5	1356.3	189	0
A5083	**15259**	27	1	0	17.1	1373.4	190	0
A5083	**15261**	29	1	0	10.3	1383.7	191	1
A5083	**15263**	2	1	0	11.1	1394.8	192	0
A5083	**15265**	4	1	0	9.6	1404.4	193	0
A5083	**15266**	5	1	0	6.1	1410.5	194	0
A5083	**15267**	6	1	0	9.3	1419.8	195	0
A5083	**15268**	7	1	0	10.5	1430.3	196	1
A5083	**15279**	11	1	0	10.5	1440.8	197	0
A5083	**15280**	12	1	0	6.7	1447.5	198	0
A5083	**15282**	14	1	0	11.4	1458.9	199	0
A5083	**15283**	15	1	0	10.6	1469.5	200	0
A5083	**15285**	17	1	0	11.9	1481.4	201	0
A5083	**15286**	18	1	0	10.1	1491.5	202	0
A5083	**15288**	20	1	0	2.3	1493.8	203	1
A5083	**15290**	2	1	0	9.9	1503.7	204	0
A5083	**15292**	4	1	0	11.6	1515.3	205	0
A5083	**15293**	5	1	0	11	1526.3	206	0
A5083	**15295**	7	1	0	13	1539.3	207	0
A5083	**15297**	9	1	0	11.3	1550.6	208	0
A5083	**15298**	10	1	0	9.2	1559.8	209	1
A5083	**15301**	2	1	0	13.2	1573	210	0
A5083	**15302**	3	1	0	8.1	1581.1	211	1
A5083	**15304**	2	1	0	12.7	1593.8	212	0
A5083	**15306**	4	1	0	12.5	1606.3	213	0
A5083	**15307**	5	1	0	14.3	1620.6	214	0
A5083	**15309**	7	1	0	10.7	1631.3	215	0
A5083	**15310**	8	1	0	10.5	1641.8	216	0
A5083	**15312**	10	1	0	12.2	1654	217	0
A5083	**15313**	11	1	0	10.4	1664.4	218	0

A5083	**15314**	12	1	0	10	1674.4	219	0
A5083	**15316**	14	1	0	11.9	1686.3	220	0
A5083	**15317**	15	1	0	13.2	1699.5	221	0
A5083	**15319**	17	1	0	11.6	1711.1	222	0
A5083	**15320**	18	1	0	7.8	1718.9	223	1
A5083	**15322**	2	1	0	11.6	1730.5	224	1
A5083	**15323**	1	1	0	12.6	1743.1	225	0
A5083	**15324**	2	1	0	9.7	1752.8	226	0
A5083	**15326**	4	1	0	12.3	1765.1	227	0
A5083	**15328**	6	1	0	10.5	1775.6	228	0
A5083	**15330**	8	1	0	11.7	1787.3	229	0
A5083	**15332**	10	1	0	11.2	1798.5	230	1
A5083	**15335**	3	1	0	10.6	1809.1	231	0
A5083	**15336**	4	1	0	8.2	1817.3	232	1
A5083	**15338**	2	1	0	8	1825.3	233	0
A5083	**15339**	3	1	0	10	1835.3	234	1
A5083	**15341**	2	1	0	13.1	1848.4	235	0
A5083	**15343**	4	1	0	8.8	1857.2	236	0
A5083	**15345**	6	1	0	8.4	1865.6	237	1
A5083	**15348**	3	1	0	1.4	1867	238	1
A5083	**15350**	2	1	0	12	1879	239	0
A5083	**15354**	6	1	0	12.5	1891.5	240	1
A5083	**15356**	2	1	0	10.1	1901.6	241	0
A5083	**15358**	4	1	0	12.2	1913.8	242	0
A5083	**15359**	5	1	0	11.2	1925	243	0
A5083	**15361**	7	1	0	10.8	1935.8	244	0
A5083	**15363**	9	1	0	11.7	1947.5	245	0
A5083	**16010**	21	1	0	10.1	1957.6	246	0
A5083	**16012**	23	1	0	11.4	1969	247	0
A5083	**16013**	24	1	0	9.4	1978.4	248	0
A5083	**16015**	26	1	0	9.1	1987.5	249	0
A5083	**16019**	30	0	1	18.1	2005.6	250	1
A5083	**16098**	79	0	0	2.1	2007.7	251	1
A5083	**16106**	8	0	0	2.3	2010	252	0
A5083	**16110**	12	0	0	2.7	2012.7	253	0
A5083	**16110**	12	0	0	3.2	2015.9	254	1
A5083	**16123**	13	0	0	3.8	2019.7	255	1

A5083	**16125**	2	0	0	2.1	2021.8	256	1
A5083	**16127**	2	0	0	4.8	2026.6	258	0
A5083	**16131**	6	0	0	11.2	2037.8	261	0
A5083	**16133**	8	0	0	7.6	2045.4	263	0
A5083	**16141**	16	0	0	3	2048.4	264	1
A5083	**16145**	4	0	0	5.8	2054.2	266	0
A5083	**16145**	5	0	0	2.2	2056.4	267	1
A5083	**16207**	62	0	0	3.6	2060	268	1
A5083	**16209**	2	0	0	2.2	2062.2	269	0
A5083	**16217**	10	0	0	4.1	2066.3	271	0
A5083	**16222**	15	0	0	3	2069.3	273	0
A5083	**16224**	17	0	0	5.8	2075.1	274	0
A5083	**16235**	28	0	0	10.2	2085.3	277	0
A5083	**16237**	30	0	0	6.1	2091.4	278	0
A5083	**16237**	30	0	0	3.3	2094.7	279	1
A5083	**16239**	2	0	0	2.5	2097.2	280	1
A5083	**16244**	5	0	0	2.1	2099.3	281	1
A5083	**16258**	14	0	0	2	2101.3	282	1
A5083	**16270**	12	0	0	3.3	2104.6	283	1
A5084	**13282**	1	0	0	1.6	1.6	1	0
A5084	**13302**	21	0	0	2	3.6	2	1
A5084	**13304**	2	0	0	4.5	8.1	3	0
A5084	**13311**	9	0	0	8.5	16.6	6	1
A5084	**13317**	6	0	0	4.3	20.9	7	1
A5084	**13326**	9	0	0	4	24.9	8	0
A5084	**13352**	36	0	0	7.2	32.1	10	0
A5084	**14008**	57	0	0	4	36.1	11	1
A5084	**14045**	37	0	0	5.9	42	12	0
A5084	**14050**	42	0	0	7.8	49.8	13	1
A5084	**14052**	2	0	0	1.2	51	14	1
A5084	**14058**	6	0	0	6.9	57.9	16	0
A5084	**14062**	10	0	0	6.7	64.6	18	1
A5084	**14064**	2	0	0	7	71.6	21	0
A5084	**14066**	4	0	0	1.5	73.1	22	1
A5084	**14071**	5	0	0	12.1	85.2	25	0
A5084	**14072**	6	0	0	11.9	97.1	28	1
A5084	**14087**	15	0	0	3.6	100.7	29	1

A5084	**14091**	4	0	0	3	103.7	30	0
A5084	**14093**	6	0	0	6	109.7	31	1
A5084	**14097**	4	0	0	7.6	117.3	33	1
A5084	**14099**	2	0	0	4.2	121.5	34	0
A5084	**14101**	4	0	0	3.6	125.1	35	1
A5084	**14104**	3	0	0	7.3	132.4	37	0
A5084	**14134**	33	0	0	7	139.4	39	0
A5084	**14136**	35	0	0	3.9	143.3	41	0
A5084	**14167**	66	0	0	9.7	153	44	1
A5084	**14183**	16	0	1	16.2	169.2	45	0
A5084	**14187**	20	1	0	11.6	180.8	46	1
A5084	**14189**	2	1	0	13.2	194	47	1
A5084	**14191**	2	1	0	11.9	205.9	48	0
A5084	**14193**	4	1	0	11.1	217	49	0
A5084	**14194**	5	1	0	11.6	228.6	50	1
A5084	**14202**	8	1	0	5.1	233.7	51	1
A5084	**14203**	1	1	0	12.9	246.6	52	0
A5084	**14204**	2	1	0	12	258.6	53	0
A5084	**14206**	4	1	0	10.8	269.4	54	0
A5084	**14207**	5	1	0	11.7	281.1	55	1
A5084	**14208**	1	1	0	9.7	290.8	56	1
A5084	**14217**	9	1	0	11.3	302.1	57	0
A5084	**14218**	10	1	0	5.2	307.3	58	1
A5084	**14220**	2	1	0	11.6	318.9	59	0
A5084	**14221**	3	1	0	13.1	332	60	0
A5084	**14222**	4	1	0	13	345	61	0
A5084	**14225**	7	1	0	11.9	356.9	62	1
A5084	**14228**	3	1	0	12.9	369.8	63	1
A5084	**14229**	1	1	0	12.6	382.4	64	1
A5084	**14230**	1	1	0	12.7	395.1	65	1
A5084	**14231**	1	1	0	12.8	407.9	66	0
A5084	**14232**	2	1	0	12.4	420.3	67	0
A5084	**14233**	3	1	0	12.1	432.4	68	0
A5084	**14234**	4	1	0	13	445.4	69	1
A5084	**14245**	11	1	0	11.8	457.2	70	1
A5084	**14247**	2	1	0	12.7	469.9	71	1
A5084	**14248**	1	1	0	12.3	482.2	72	0

A5084	**14250**	3	1	0	12.5	494.7	73	0
A5084	**14251**	4	1	0	12.7	507.4	74	1
A5084	**14258**	7	1	0	12.2	519.6	75	1
A5084	**14260**	2	1	0	12.5	532.1	76	1
A5084	**14266**	6	1	0	11.7	543.8	77	0
A5084	**14267**	7	1	0	11.3	555.1	78	0
A5084	**14268**	8	1	0	12.1	567.2	79	1
A5084	**14269**	1	1	0	12.5	579.7	80	0
A5084	**14270**	2	1	0	11.7	591.4	81	1
A5084	**14271**	1	1	0	13.6	605	82	1
A5084	**14272**	1	1	0	12.1	617.1	83	1
A5084	**14274**	2	1	0	1.2	618.3	84	1
A5084	**14275**	1	1	0	10	628.3	85	1
A5084	**14276**	1	1	0	12.2	640.5	86	1
A5084	**14277**	1	1	0	12.7	653.2	87	0
A5084	**14279**	3	1	0	11.5	664.7	88	0
A5084	**14281**	5	1	0	14	678.7	89	1
A5084	**14282**	1	1	0	13.3	692	90	0
A5084	**14283**	2	1	0	12.3	704.3	91	0
A5084	**14285**	4	1	0	12.8	717.1	92	0
A5084	**14286**	5	1	0	13.1	730.2	93	1
A5084	**14289**	3	1	0	13.5	743.7	94	0
A5084	**14297**	11	1	0	12.7	756.4	95	1
A5084	**14302**	5	1	0	13	769.4	96	1
A5084	**14307**	5	1	0	13.1	782.5	97	0
A5084	**14310**	8	0	1	17.6	800.1	98	1
A5084	**15051**	107	0	0	1.3	801.4	99	1
A5084	**15140**	89	0	0	3.5	804.9	100	0
A5084	**15146**	95	0	0	5.6	810.5	101	1
A5084	**15160**	14	0	0	9.6	820.1	104	0
A5084	**15161**	15	0	0	1.9	822	105	0
A5084	**15162**	16	0	0	4.3	826.3	106	0
A5084	**15162**	16	0	0	3.8	830.1	107	1
A5084	**15169**	6	0	0	6.3	836.4	109	0
A5084	**16225**	428	0	0	1.8	838.2	110	1
A5084	**16232**	7	0	0	4.5	842.7	112	0
A5084	**16236**	12	0	0	6.8	849.5	114	0

A5084	**16243**	19	0	0	7.1	856.6	116	0
A5084	**16251**	27	0	0	2.9	859.5	117	0
A5084	**16251**	27	0	0	2.5	862	118	1
A5084	**16253**	2	0	0	2.8	864.8	119	1
A5084	**16263**	10	0	0	6.1	870.9	122	0
A5084	**16265**	12	0	0	4.3	875.2	124	0
A5084	**16267**	14	0	0	1.9	877.1	125	0
A5084	**16267**	14	0	0	1.6	878.7	126	1
A5084	**16312**	45	0	0	10	888.7	129	0
A5084	**16314**	47	0	0	4.8	893.5	131	0
A5084	**16322**	55	0	0	2.4	895.9	132	1
A5084	**16326**	4	0	0	6.1	902	134	0
A5084	**16326**	4	0	0	2.2	904.2	135	1
A5084	**16333**	7	0	0	3	907.2	136	0
A5084	**16335**	9	0	0	5	912.2	137	1
A5085	**14157**	1	0	1	1.4	1.4	1	1
A5085	**14168**	12	0	0	6.3	7.7	3	0
A5085	**14168**	12	0	0	4.4	12.1	4	1
A5085	**14183**	15	0	0	2.4	14.5	5	0
A5085	**14183**	15	0	0	3.2	17.7	6	1
A5085	**15132**	215	0	0	7.1	24.8	8	0
A5085	**15134**	217	0	0	4.6	29.4	9	1
A5085	**15138**	4	0	0	3.1	32.5	10	0
A5085	**15138**	4	0	0	1.7	34.2	11	1
A5085	**15148**	10	0	0	2.2	36.4	12	1
A5085	**15159**	10	0	0	3.2	39.6	13	0
A5085	**15159**	10	0	0	2.6	42.2	14	1
A5085	**15159**	0	0	0	1.2	43.4	15	1
A5085	**15161**	2	0	0	2.3	45.7	16	0
A5085	**15161**	2	0	0	2.5	48.2	17	1
A5085	**15168**	7	0	0	2.8	51	18	1
A5085	**15238**	70	0	0	7.8	58.8	20	0
A5085	**15240**	72	0	0	2.7	61.5	21	0
A5085	**15251**	83	0	0	2.3	63.8	22	1
A5085	**15267**	16	0	0	1.6	65.4	23	0
A5085	**16134**	249	0	0	2	67.4	24	0
A5085	**16179**	281	0	0	10.1	77.5	27	0

A5085	**16181**	283	0	0	2.9	80.4	28	0
A5085	**16187**	289	0	0	5.5	85.9	30	0
A5085	**16189**	291	0	0	2.9	88.8	31	1
A5085	**16193**	4	0	0	1.6	90.4	32	0
A5085	**16193**	4	0	0	2.8	93.2	33	1
A5085	**16195**	2	0	0	4.3	97.5	35	0
A5085	**16200**	7	0	0	2.4	99.9	36	1
A5085	**16202**	2	0	0	4	103.9	38	0
A5085	**16204**	4	0	0	6.1	110	40	0
A5085	**16207**	7	0	0	2.9	112.9	41	0
A5085	**16207**	7	0	0	2.4	115.3	42	1
A5085	**16218**	11	0	0	15.8	131.1	43	0
A5085	**16227**	20	0	0	3.4	134.5	44	0
A5085	**16229**	22	0	0	4	138.5	45	0
A5085	**16231**	24	0	0	3	141.5	46	0
A5085	**16235**	28	0	0	3.5	145	47	0
A5085	**16236**	29	0	0	2.1	147.1	48	0
A5085	**16237**	30	0	0	6.9	154	50	0
A5085	**16241**	34	0	0	7.8	161.8	51	0
A5085	**16242**	35	0	0	6.6	168.4	53	0
A5085	**16243**	36	0	0	3.2	171.6	54	0
A5085	**16244**	37	0	0	3.5	175.1	55	0
A5085	**16249**	42	0	0	2.7	177.8	56	0
A5085	**16252**	45	0	0	3.5	181.3	57	1
A5085	**16256**	4	0	1	10.1	191.4	58	0
A5085	**16257**	5	0	0	3.6	195	59	0
A5085	**16257**	5	0	0	1.7	196.7	60	1
A5085	**16258**	1	0	0	7.8	204.5	62	0
A5085	**16261**	4	0	0	3.4	207.9	63	0
A5085	**16261**	4	0	0	3	210.9	64	1
A5085	**16269**	8	0	0	3.5	214.4	65	1
A5085	**16271**	2	0	1	8.9	223.3	66	0
A5085	**16275**	6	0	0	9.9	233.2	67	1
A5085	**16314**	39	0	1	7.5	233.2	67	0
A5085	**16320**	45	0	1	11	251.7	69	1
A5085	**16322**	2	0	0	6.9	258.6	71	0
A5085	**16326**	6	0	0	4.5	263.1	72	0

A5085	**16326**	6	0	0	3.6	266.7	73	1
A5085	**16332**	6	0	1	11.1	277.8	74	1
A5087	**13289**	1	0	1	2.9	2.9	1	0
A5087	**13294**	6	0	0	5.9	8.8	3	0
A5087	**13298**	10	0	0	1.8	10.6	4	1
A5087	**13329**	31	0	0	8.4	19	7	0
A5087	**13331**	33	0	0	4.2	23.2	8	1
A5087	**13346**	15	0	0	5.3	28.5	9	0
A5087	**13350**	19	0	0	6.7	35.2	11	0
A5087	**13352**	21	0	0	3.7	38.9	12	1
A5087	**13354**	2	0	0	1.9	40.8	13	0
A5087	**14003**	16	0	0	4	44.8	15	1
A5087	**14080**	77	0	0	4.4	49.2	16	0
A5087	**14098**	95	0	0	2.6	51.8	17	1
A5087	**14100**	2	0	0	7.2	59	19	0
A5087	**14105**	7	0	0	6	65	20	1
A6093	**14164**	1	0	0	1.3	1.3	1	1
A6093	**14167**	4	0	0	4.2	5.5	2	1
A6093	**14169**	2	0	0	3.5	9	3	0
A6093	**14169**	2	0	0	3.9	12.9	4	1
A6093	**14175**	6	0	0	7.7	20.6	6	0
A6093	**14178**	9	0	0	3	23.6	7	0
A6093	**14181**	12	0	0	1.4	25	8	0
A6093	**14189**	20	0	0	3.9	28.9	9	1
A6093	**14192**	3	0	0	4.4	33.3	10	0
A6093	**14195**	6	0	0	5.7	39	12	0
A6093	**14197**	8	0	0	4.2	43.2	14	0
A6093	**14202**	13	0	0	3.2	46.4	15	0
A6093	**14202**	13	0	0	3.1	49.5	16	1
A6093	**14204**	2	0	0	1.4	50.9	17	1
A6093	**14205**	1	0	0	4.9	55.8	19	0
A6093	**14206**	2	0	0	3.1	58.9	20	0
A6093	**14216**	12	0	0	3.3	62.2	21	1
A6093	**14218**	2	0	0	13	75.2	23	0
A6093	**14219**	3	0	0	2.2	77.4	24	0
A6093	**14220**	4	0	0	4.2	81.6	26	0
A6093	**14233**	17	0	0	4.3	85.9	27	1

A6093	**14238**	5	0	0	6.1	92	28	1
A6093	**14239**	1	0	0	9.3	101.3	31	0
A6093	**14246**	8	0	0	2	103.3	32	0
A6093	**14248**	10	0	0	1.6	104.9	33	1
A6093	**14248**	0	0	0	5.2	110.1	35	0
A6093	**14252**	4	0	0	9.4	119.5	38	0
A6093	**14254**	6	0	0	9.3	128.8	41	0
A6093	**14258**	10	0	0	3.9	132.7	42	0
A6093	**14260**	12	0	0	9.4	142.1	45	0
A6093	**14262**	14	0	0	5.3	147.4	47	0
A6093	**14265**	17	0	0	7.5	154.9	50	0
A6093	**14267**	19	0	0	2.6	157.5	51	1
A6093	**14282**	15	0	0	4.4	161.9	52	1
A6093	**14287**	5	0	0	3.4	165.3	53	1
A6093	**14301**	14	0	1	7	172.3	54	0
A6093	**14303**	16	0	0	6.2	178.5	55	0
A6093	**14307**	20	0	0	4.3	182.8	56	1
A6093	**14311**	4	0	0	3.9	186.7	58	0
A6093	**14316**	9	0	0	7.4	194.1	60	0
A6093	**14318**	11	0	0	4.4	198.5	62	0
A6093	**14335**	28	0	0	4.8	203.3	65	0
A6093	**14337**	30	0	0	7.2	210.5	67	0
A6093	**14356**	49	0	0	3.5	214	68	0
A6093	**14364**	57	0	1	7.1	221.1	69	0
A6093	**15007**	65	0	0	3	224.1	70	1
A6093	**15020**	13	0	0	9.4	233.5	73	0
A6093	**15022**	15	0	0	3	236.5	74	1
A6093	**15023**	1	0	0	4.8	241.3	76	0
A6093	**15027**	5	0	0	9.9	251.2	80	0
A6093	**15029**	7	0	0	7.8	259	82	0
A6093	**15034**	12	1	0	17	276	83	0
A6093	**15038**	16	1	0	11.6	287.6	84	0
A6093	**15039**	17	1	0	12.1	299.7	85	0
A6093	**15041**	19	1	0	13.3	313	86	0
A6093	**15042**	20	1	0	13.5	326.5	87	0
A6093	**15044**	22	1	0	11.5	338	88	0
A6093	**15047**	25	1	0	13.1	351.1	89	0

A6093	**15049**	27	1	0	11.7	362.8	90	0
A6093	**15050**	28	1	0	12.4	375.2	91	0
A6093	**15053**	31	1	0	12.7	387.9	92	0
A6093	**15055**	33	1	0	9.7	397.6	93	0
A6093	**15061**	39	1	0	12.3	409.9	94	0
A6093	**15062**	40	1	0	13.6	423.5	95	1
A6093	**15064**	2	1	0	14.1	437.6	96	0
A6093	**15066**	4	1	0	12.9	450.5	97	0
A6093	**15068**	6	1	0	7.8	458.3	98	0
A6093	**15070**	8	1	0	12	470.3	99	0
A6093	**15072**	10	1	0	12.6	482.9	100	1
A6093	**15074**	2	1	0	12.1	495	101	1
A6093	**15077**	3	1	0	14	509	102	0
A6093	**15078**	4	1	0	12.3	521.3	103	0
A6093	**15079**	5	1	0	12.2	533.5	104	0
A6093	**15097**	23	1	0	12.9	546.4	105	0
A6093	**15099**	25	1	0	10.2	556.6	106	0
A6093	**15100**	26	1	0	12.4	569	107	0
A6093	**15102**	28	1	0	11.7	580.7	108	0
A6093	**15105**	31	1	0	12.9	593.6	109	1
A6093	**15106**	1	1	0	10.8	604.4	110	1
A6093	**15108**	2	1	0	12.7	617.1	111	0
A6093	**15110**	4	1	0	12.2	629.3	112	0
A6093	**15111**	5	1	0	12.5	641.8	113	0
A6093	**15112**	6	1	0	12.7	654.5	114	0
A6093	**15113**	7	1	0	13.2	667.7	115	0
A6093	**15117**	10	1	0	11.8	679.5	116	0
A6093	**15118**	11	1	0	13.1	692.6	117	1
A6093	**15123**	5	1	0	10.8	703.4	118	0
A6093	**15125**	7	1	0	11	714.4	119	0
A6093	**15126**	8	1	0	12.1	726.5	120	0
A6093	**15129**	11	1	0	11.9	738.4	121	0
A6093	**15141**	23	1	0	12.3	750.7	122	0
A6093	**15151**	33	1	0	12.2	762.9	123	0
A6093	**15152**	34	1	0	11.2	774.1	124	0
A6093	**15154**	36	1	0	11.4	785.5	125	0
A6093	**15155**	37	1	0	11.2	796.7	126	0

A6093	**15157**	39	1	0	12.5	809.2	127	1
A6093	**15159**	2	1	0	9.7	818.9	128	1
A6093	**15162**	3	1	0	11	829.9	129	0
A6093	**15163**	4	1	0	11.7	841.6	130	0
A6093	**15165**	6	1	0	13.2	854.8	131	0
A6093	**15167**	8	1	0	10.9	865.7	132	0
A6093	**15168**	9	1	0	12.2	877.9	133	0
A6093	**15169**	10	1	0	11.4	889.3	134	0
A6093	**15170**	11	1	0	11.1	900.4	135	0
A6093	**15172**	13	1	0	9.6	910	136	0
A6093	**15174**	15	1	0	11.8	921.8	137	0
A6093	**15183**	24	1	0	10	931.8	138	0
A6093	**15185**	26	1	0	11.5	943.3	139	0
A6093	**15186**	27	1	0	11.4	954.7	140	0
A6093	**15187**	28	1	0	11.6	966.3	141	1
A6093	**15191**	4	1	0	9.7	976	142	0
A6093	**15193**	6	1	0	12.9	988.9	143	0
A6093	**15198**	11	0	0	17.3	1006.2	144	1
A6093	**15314**	116	0	1	1.8	1008	145	0
A6093	**15321**	123	0	0	4.6	1012.6	147	0
A6093	**15323**	125	0	0	6.8	1019.4	149	0
A6093	**15334**	136	0	0	2.2	1021.6	150	0
A6093	**15338**	140	0	0	3.6	1025.2	152	0
A6093	**15342**	144	0	0	4.6	1029.8	153	1
A6093	**15355**	13	0	0	7.5	1037.3	155	0
A6093	**16026**	50	0	0	6.4	1043.7	156	0
A6093	**16026**	50	0	0	5	1048.7	157	1
A6093	**16028**	2	0	0	3.1	1051.8	158	1
A6093	**16098**	70	0	0	3.5	1055.3	159	1
A6093	**16103**	5	0	0	3.3	1058.6	160	0
A6093	**16103**	5	0	0	3.7	1062.3	161	1
A6093	**16104**	1	0	0	6.2	1068.5	163	0
A6093	**16105**	2	0	0	2.9	1071.4	164	1
A6093	**16113**	8	0	0	2.2	1073.6	165	1
A6093	**16158**	45	0	0	3.8	1077.4	166	1
A6093	**16160**	2	0	0	6	1083.4	168	0
A6093	**16160**	2	0	0	3.9	1087.3	169	1

A6093	**16179**	19	0	0	4	1091.3	170	0
A6093	**16181**	21	0	0	8.3	1099.6	172	0
A6093	**16201**	41	0	0	3.5	1103.1	173	1
A6094	**13280**	1	0	0	5.3	5.3	2	0
A6094	**13282**	3	0	0	6.1	11.4	4	0
A6094	**13283**	4	0	0	3	14.4	5	0
A6094	**13289**	10	0	0	8	22.4	7	0
A6094	**13294**	15	0	0	6.1	28.5	9	0
A6094	**13296**	17	0	0	7.2	35.7	11	0
A6094	**13298**	19	0	0	2.7	38.4	12	1
A6094	**13302**	4	0	0	2.8	41.2	13	0
A6094	**13304**	6	0	0	2.4	43.6	14	0
A6094	**13309**	11	0	0	2.4	46	15	0
A6094	**13311**	13	0	0	3.4	49.4	16	0
A6094	**13311**	14	0	0	2.5	51.9	17	1
A6094	**13340**	29	0	0	2.1	54	18	1
A6094	**13344**	4	0	0	2.6	56.6	19	1
A6094	**13346**	2	0	0	5.6	62.2	21	0
A6094	**13350**	6	0	0	5.8	68	23	0
A6094	**13352**	8	0	0	3.5	71.5	24	1
A6094	**13354**	2	0	0	3.5	75	26	0
A6094	**14007**	20	1	0	16.4	91.4	27	1
A6094	**14010**	3	1	0	11.7	103.1	28	0
A6094	**14012**	5	1	0	12.8	115.9	29	0
A6094	**14014**	7	1	0	12	127.9	30	0
A6094	**14016**	9	1	0	11.8	139.7	31	0
A6094	**14018**	11	1	0	14.3	154	32	0
A6094	**14020**	13	1	0	11.9	165.9	33	0
A6094	**14021**	14	1	0	11.9	177.8	34	0
A6094	**14022**	15	1	0	12.7	190.5	35	0
A6094	**14023**	16	1	0	12.8	203.3	36	0
A6094	**14025**	18	1	0	12	215.3	37	0
A6094	**14026**	19	1	0	15.4	230.7	38	0
A6094	**14027**	20	1	0	0.5	231.2	39	0
A6094	**14028**	21	1	0	12.4	243.6	40	1
A6094	**14029**	1	1	0	12.6	256.2	41	0
A6094	**14030**	2	1	0	12.4	268.6	42	0

A6094	**14031**	3	1	0	13.2	281.8	43	0
A6094	**14033**	5	1	0	12.3	294.1	44	0
A6094	**14034**	6	1	0	11.4	305.5	45	0
A6094	**14035**	7	1	0	11.8	317.3	46	1
A6094	**14036**	1	1	0	12.5	329.8	47	0
A6094	**14038**	3	1	0	12.2	342	48	0
A6094	**14039**	4	1	0	12.5	354.5	49	1
A6094	**14041**	2	1	0	12.4	366.9	50	0
A6094	**14042**	3	1	0	12.2	379.1	51	0
A6094	**14045**	6	1	0	13.5	392.6	52	1
A6094	**14047**	2	1	0	12.6	405.2	53	0
A6094	**14049**	4	1	0	12.5	417.7	54	1
A6094	**14052**	3	1	0	13.2	430.9	55	0
A6094	**14053**	4	1	0	12.3	443.2	56	0
A6094	**14054**	5	1	0	12.3	455.5	57	0
A6094	**14056**	7	1	0	12.9	468.4	58	0
A6094	**14057**	8	1	0	12.7	481.1	59	0
A6094	**14059**	10	1	0	12.6	493.7	60	1
A6094	**14060**	1	1	0	14.3	508	61	0
A6094	**14061**	2	1	0	12.1	520.1	62	0
A6094	**14062**	3	1	0	12.1	532.2	63	0
A6094	**14064**	5	1	0	12.4	544.6	64	0
A6094	**14065**	6	1	0	12.3	556.9	65	0
A6094	**14066**	7	1	0	13.1	570	66	1
A6094	**14067**	1	1	0	1.1	571.1	67	1
A6094	**14069**	2	1	0	11.8	582.9	68	0
A6094	**14073**	6	1	0	12.3	595.2	69	0
A6094	**14074**	7	1	0	12.2	607.4	70	0
A6094	**14076**	9	1	0	12.3	619.7	71	1
A6094	**14077**	1	1	0	12.7	632.4	72	0
A6094	**14079**	3	1	0	12.3	644.7	73	0
A6094	**14081**	5	1	0	12.8	657.5	74	0
A6094	**14082**	6	1	0	12.4	669.9	75	0
A6094	**14084**	8	1	0	12.9	682.8	76	0
A6094	**14085**	9	1	0	13.4	696.2	77	0
A6094	**14087**	11	1	0	13.6	709.8	78	0
A6094	**14088**	12	1	0	12.8	722.6	79	1

A6094	**14089**	1	1	0	13	735.6	80	0
A6094	**14090**	2	1	0	12.8	748.4	81	1
A6094	**14091**	1	1	0	13	761.4	82	1
A6094	**14106**	5	1	0	12.3	773.7	83	0
A6094	**14107**	6	1	0	11.3	785	84	0
A6094	**14109**	8	1	0	12.1	797.1	85	1
A6094	**14110**	1	1	0	9	806.1	86	1
A6094	**14115**	5	1	0	12.5	818.6	87	0
A6094	**14117**	7	1	0	12.8	831.4	88	1
A6094	**14119**	2	1	0	1.6	833	89	1
A6094	**14122**	3	1	0	12	845	90	0
A6094	**14123**	4	1	0	12.4	857.4	91	1
A6094	**14125**	2	1	0	1.1	858.5	92	1
A6094	**14126**	1	1	0	12.3	870.8	93	0
A6094	**14127**	2	1	0	11.5	882.3	94	0
A6094	**14128**	3	1	0	12.5	894.8	95	0
A6094	**14129**	4	1	0	12.2	907	96	0
A6094	**14130**	5	1	0	12.9	919.9	97	0
A6094	**14132**	7	1	0	14.3	934.2	98	0
A6094	**14134**	9	1	0	13.7	947.9	99	0
A6094	**14135**	10	1	0	12.7	960.6	100	0
A6094	**14137**	12	1	0	12.7	973.3	101	0
A6094	**14138**	13	1	0	12.7	986	102	0
A6094	**14140**	15	0	0	2.2	988.2	103	0
A6094	**14140**	16	0	0	2.1	990.3	104	1
A6094	**14142**	2	1	0	1.2	991.5	105	1
A6094	**14153**	11	1	0	13.5	1005	106	0
A6094	**14155**	13	1	0	14.2	1019.2	107	0
A6094	**14156**	14	1	0	12.8	1032	108	0
A6094	**14160**	18	1	0	12.9	1044.9	109	0
A6094	**14161**	19	1	0	12.4	1057.3	110	0
A6094	**14162**	20	1	0	12.3	1069.6	111	0
A6094	**14164**	22	1	0	12.9	1082.5	112	0
A6094	**14165**	23	1	0	12.5	1095	113	0
A6094	**14166**	24	1	0	13.7	1108.7	114	0
A6094	**14167**	25	1	0	12.4	1121.1	115	0
A6094	**14168**	26	1	0	9	1130.1	116	1

A6094	**14171**	3	1	0	11.3	1141.4	117	0
A6094	**14172**	4	1	0	5.3	1146.7	118	1
A6094	**14174**	2	1	0	13.2	1159.9	119	0
A6094	**14175**	3	1	0	13.2	1173.1	120	0
A6094	**14176**	4	1	0	12.4	1185.5	121	0
A6094	**14178**	6	1	0	11.7	1197.2	122	0
A6094	**14179**	7	1	0	11.8	1209	123	0
A6094	**14180**	8	1	0	11.3	1220.3	124	0
A6094	**14182**	10	1	0	11.6	1231.9	125	0
A6094	**14183**	11	1	0	12.5	1244.4	126	0
A6094	**14184**	12	1	0	13	1257.4	127	0
A6094	**14185**	13	1	0	12.8	1270.2	128	1
A6094	**14186**	1	1	0	13.3	1283.5	129	0
A6094	**14188**	3	1	0	12.4	1295.9	130	1
A6094	**14189**	1	1	0	0.9	1296.8	131	1
A6094	**14193**	4	1	0	11.8	1308.6	132	0
A6094	**14195**	6	1	0	12.1	1320.7	133	0
A6094	**14196**	7	1	0	12.3	1333	134	0
A6094	**14198**	9	1	0	12.5	1345.5	135	0
A6094	**14200**	11	1	0	11.9	1357.4	136	0
A6094	**14201**	12	1	0	12.7	1370.1	137	0
A6094	**14202**	13	1	0	12.2	1382.3	138	0
A6094	**14204**	15	1	0	12.2	1394.5	139	0
A6094	**14205**	16	1	0	12.5	1407	140	0
A6094	**14206**	17	1	0	12.1	1419.1	141	0
A6094	**14208**	19	1	0	11.6	1430.7	142	1
A6094	**14211**	3	1	0	11.9	1442.6	143	1
A6094	**14212**	1	1	0	11.9	1454.5	144	0
A6094	**14214**	3	1	0	12.8	1467.3	145	1
A6094	**14216**	2	1	0	4	1471.3	146	1
A6094	**14220**	4	1	0	12.5	1483.8	147	0
A6094	**14221**	5	1	0	11.8	1495.6	148	0
A6094	**14223**	7	1	0	12.7	1508.3	149	0
A6094	**14224**	8	1	0	11.8	1520.1	150	0
A6094	**14226**	10	1	0	13.4	1533.5	151	0
A6094	**14229**	13	1	0	13.2	1546.7	152	0
A6094	**14233**	17	0	0	17.4	1564.1	153	0

A6094	**14261**	45	0	0	9.3	1573.4	156	0
A6094	**14265**	49	0	0	7.1	1580.5	158	0
A6094	**14267**	51	0	0	3	1583.5	159	0
A6094	**14274**	58	0	0	7.1	1590.6	161	0
A6094	**14276**	60	0	0	2.5	1593.1	162	1
A6094	**14282**	6	0	0	5.2	1598.3	163	0
A6094	**14282**	6	0	0	1	1599.3	164	1
A6094	**14336**	53	0	0	8.8	1608.1	167	0
A6094	**14338**	55	0	0	5.4	1613.5	169	0
A6094	**14338**	55	0	0	3.3	1616.8	170	1
A6094	**14343**	5	0	0	3.5	1620.3	171	1
A6094	**14346**	3	0	0	2.8	1623.1	172	0
A6094	**14346**	3	0	0	2.2	1625.3	173	1
A6094	**14352**	6	0	1	3.8	1629.1	174	0
A6094	**15228**	247	0	0	3.4	1632.5	175	1
A6094	**15231**	3	0	0	5.7	1638.2	177	0
A6094	**15251**	23	0	0	6.7	1644.9	179	0
A6094	**15253**	25	0	0	10.3	1655.2	181	0
A6094	**15258**	30	0	0	5.3	1660.5	182	0
A6094	**15264**	36	0	0	7.9	1668.4	185	0
A6094	**15266**	38	0	0	9.6	1678	188	0
A6094	**15268**	40	0	0	4.6	1682.6	190	0
A6094	**15274**	46	0	0	7	1689.6	192	0
A6094	**15278**	50	0	0	9.6	1699.2	195	0
A6094	**15280**	52	0	0	4.2	1703.4	196	1
A6094	**15286**	6	0	0	3.8	1707.2	197	1
A6094	**15288**	2	0	0	5	1712.2	198	0
A6094	**15293**	7	0	0	4.7	1716.9	199	0
A6094	**15299**	13	0	0	9	1725.9	201	0
A6094	**15301**	15	0	0	9.1	1735	203	0
A6094	**15306**	20	0	0	3.9	1738.9	204	0
A6094	**15306**	20	0	0	3	1741.9	205	1
A6094	**15308**	2	0	0	8.4	1750.3	207	0
A6094	**15310**	4	0	0	5.1	1755.4	209	0
A6094	**15320**	14	0	0	3	1758.4	210	0
A6094	**15322**	16	0	0	7.1	1765.5	212	0
A6094	**15324**	18	0	0	3.5	1769	214	0

A6094	**15328**	22	0	0	4.4	1773.4	215	0
A6094	**15328**	22	0	0	4.3	1777.7	216	1
A6094	**15341**	13	0	0	4.9	1782.6	217	0
A6094	**15341**	14	0	0	5.1	1787.7	218	1
A6094	**16235**	260	0	0	1.8	1789.5	219	0
A6094	**16243**	268	0	0	4.7	1794.2	220	1
A6094	**16251**	8	0	0	7.5	1801.7	223	0
A6094	**16253**	10	0	0	5.1	1806.8	224	0
A6094	**16307**	64	0	0	3.2	1810	225	0
A6094	**16307**	64	0	0	6.2	1816.2	226	1
A6094	**16309**	2	0	0	5.4	1821.6	227	0
A6094	**16320**	13	0	0	9	1830.6	230	0
A6094	**16322**	15	0	0	2.4	1833	231	1
A6095	**14113**	1	0	0	7.3	7.3	2	0
A6095	**14113**	0	0	0	2.5	9.8	3	1
A6095	**14135**	22	0	0	5.4	15.2	4	1
A6095	**14142**	7	0	0	3.9	19.1	5	0
A6095	**14148**	13	0	0	5.2	24.3	6	0
A6095	**14148**	13	0	0	2	26.3	7	1
A6095	**14155**	7	0	0	3.4	29.7	9	0
A6095	**14155**	8	0	0	1.4	31.1	10	1
A6095	**14168**	13	0	0	4.8	35.9	11	0
A6095	**14168**	13	0	0	4	39.9	12	1
A6095	**14170**	2	0	0	3.3	43.2	13	1
A6095	**14176**	6	0	0	3.5	46.7	14	1
A6095	**14184**	9	0	0	5.6	52.3	15	1
A6095	**14217**	33	0	0	4.8	57.1	16	0
A6095	**14224**	40	0	0	2.1	59.2	17	0
A6095	**14226**	42	0	0	6.4	65.6	18	1
A6095	**14231**	5	0	0	1.7	67.3	19	0
A6095	**14251**	26	0	0	7.1	74.4	21	0
A6095	**14251**	26	0	0	2.5	76.9	22	1
A6095	**14253**	2	0	0	2.6	79.5	23	1
A6095	**14255**	2	0	0	8.3	87.8	24	0
A6095	**14260**	7	1	0	4.5	92.3	25	0
A6095	**15134**	246	0	1	1.6	93.9	26	0
A6095	**15167**	279	0	0	5.4	99.3	28	0

A6095	**15173**	285	0	0	8.1	107.4	30	0
A6095	**15175**	287	0	0	9.3	116.7	32	0
A6095	**15211**	323	0	0	2.9	119.6	33	1
A6095	**15216**	5	0	0	3.1	122.7	34	0
A6095	**15232**	21	0	0	6.4	129.1	36	0
A6095	**15237**	26	0	0	9.6	138.7	38	0
A6095	**15239**	28	0	0	9.8	148.5	40	0
A6095	**15243**	32	0	0	5	153.5	41	0
A6095	**15245**	34	0	0	2.4	155.9	42	1
A6095	**15259**	14	0	0	2.5	158.4	43	1
A6095	**15265**	6	0	0	7.4	165.8	45	0
A6095	**15265**	6	0	0	2.9	168.7	46	1
A6095	**15274**	9	0	0	6.9	175.6	48	0
A6095	**15279**	14	0	0	3.6	179.2	49	0
A6095	**15279**	14	0	0	2.4	181.6	50	1
A6095	**15286**	7	0	0	4.3	185.9	51	0
A6095	**15288**	9	0	0	7.5	193.4	53	0
A6095	**15293**	14	0	0	4.7	198.1	54	0
A6095	**15294**	15	0	0	4.5	202.6	55	0
A6095	**15295**	16	0	0	7.9	210.5	57	0
A6095	**15342**	63	0	0	3.8	214.3	58	1
A6095	**15344**	2	0	0	9.8	224.1	60	0
A6095	**15348**	6	0	0	3.3	227.4	61	1
A6095	**16053**	75	0	0	3.2	230.6	62	0
A6095	**16053**	76	0	0	3.1	233.7	63	1
A6095	**16092**	39	0	0	4.7	238.4	64	1
A6095	**16096**	4	0	0	1.9	240.3	65	1
A6095	**16123**	27	0	0	8.3	248.6	67	0
A6095	**16125**	29	0	0	9.2	257.8	70	0
A6095	**16137**	41	0	0	2.7	260.5	71	1
A6095	**16139**	2	0	0	10.8	271.3	74	0
A6095	**16141**	4	0	0	3.7	275	75	0
A6095	**16145**	8	0	0	8.1	283.1	77	0
A6095	**16147**	10	0	0	4.5	287.6	79	0
A6095	**16154**	17	0	0	7.5	295.1	81	0
A6095	**16158**	21	0	0	3.3	298.4	82	1
A6095	**16201**	43	0	0	1.4	299.8	83	0

A6095	**16203**	45	0	0	2.5	302.3	84	0
A6095	**16203**	45	0	0	2.7	305	85	1
A6095	**16225**	22	0	0	1.7	306.7	86	0
A6095	**16229**	26	0	0	9.5	316.2	89	0
A6095	**16244**	41	0	0	8.9	325.1	92	0
A6095	**16250**	47	0	0	7.1	332.2	95	0
A6095	**16252**	49	0	0	4.8	337	97	0
A6095	**16256**	53	0	0	5.9	342.9	99	0
A6095	**16258**	55	0	0	3.5	346.4	101	0
A6095	**16260**	57	0	0	6.2	352.6	103	0
A6095	**16263**	60	0	0	1.5	354.1	104	0
A6095	**16307**	104	0	1	7.7	361.8	105	0
A6095	**16308**	105	0	0	2.7	364.5	106	1
A6095	**16313**	5	0	0	4.2	368.7	107	0
A6095	**16323**	15	0	0	3.9	372.6	108	1
A6095	**16335**	12	0	0	3.1	375.7	109	1
A6097	**16253**	1	0	0	0	0	1	0
A6097	**16309**	57	0	0	4	4	1	0
A6097	**16319**	1	0	0	1.8	5.8	2	1
A6097	**16321**	3	0	0	7.6	17.4	4	0
A6097	**16323**	5	0	0	2.3	19.7	5	1
A6099	**14141**	1	0	0	3.8	3.8	1	0
A6099	**14190**	50	0	0	4.4	11	3	1
A6099	**14205**	15	0	0	2.8	13.8	4	1
A6099	**14223**	18	0	0	2.5	16.3	5	1
A6099	**14309**	86	0	0	4.3	20.6	6	1
A6099	**14323**	14	0	0	6.6	27.2	7	1
A6099	**14342**	19	0	0	2.5	29.7	8	1
A6099	**14344**	22	0	0	2.7	32.4	9	0
A6099	**14346**	24	0	0	4.7	37.1	10	1
A6099	**14351**	5	0	0	5.7	42.8	11	0
A6099	**14353**	7	0	0	3.3	39.2	12	1
A6099	**15005**	17	0	0	1.7	40.9	14	0
A6099	**15007**	19	0	1	9	49.9	15	0
A6099	**15009**	21	0	0	3.3	53.2	17	0
A6099	**15013**	25	0	0	5.7	58.9	18	1
A6099	**15013**	1	0	0	1.8	60.7	19	0

A6099	**15015**	3	0	0	3.6	64.3	21	1
A6099	**15021**	6	0	0	9	73.3	23	1
A6099	**15028**	7	0	0	8	81.3	31	1
A6099	**15037**	9	0	0	3.9	85.2	41	0
A6099	**15041**	13	0	0	7.8	93	42	0
A6099	**15042**	14	0	0	6.3	99.3	43	0
A6099	**15049**	21	0	0	7.1	106.4	45	0
A6099	**15061**	33	0	0	3	109.4	46	0
A6099	**15062**	34	0	0	5.4	114.8	48	0
A6099	**15064**	36	0	0	3.3	118.1	49	0
A6099	**15068**	40	0	0	6.6	124.7	51	0
A6099	**15069**	41	0	0	5.2	129.9	53	0
A6099	**15070**	42	0	0	2.9	132.8	54	0
A6099	**15071**	43	0	0	3.2	136	55	0
A6099	**15072**	44	0	0	4.8	140.8	57	0
A6099	**15073**	45	0	0	1.8	142.6	58	0
A6099	**15076**	48	0	0	10	152.6	60	0
A6099	**15090**	62	0	0	5.6	158.2	61	0
A6099	**15097**	69	0	0	6.3	164.5	62	0
A6099	**15099**	71	0	0	5.1	169.6	63	1
A6099	**15113**	14	0	0	5	174.6	64	0
A6099	**15117**	18	0	0	4	178.6	65	0
A6099	**15123**	24	0	0	6.2	184.8	66	1
A6099	**15266**	143	0	0	4.4	189.2	68	1
A6099	**15268**	2	0	0	1	190.2	69	0
A6099	**15271**	5	0	0	5	195.2	71	0
A6099	**15275**	9	0	0	2.9	198.1	72	1
A6099	**15279**	13	0	0	3.6	201.7	73	1
A6099	**15281**	2	0	0	6.8	208.5	75	0
A6099	**15294**	15	0	0	4.8	213.3	76	0
A6099	**15295**	16	0	0	1.6	214.9	77	0
A6099	**15314**	35	0	0	7.3	222.2	79	0
A6099	**15317**	38	0	0	2.5	224.7	80	0
A6099	**15320**	41	0	0	7.8	232.5	82	0
A6099	**15322**	43	0	0	4.3	236.8	83	0
A6099	**15324**	45	0	0	3.1	239.9	85	0
A6099	**15334**	55	0	0	6.7	246.6	87	0

A6099	**15336**	57	0	0	4	250.6	89	0
A6099	**15338**	59	0	0	4.9	255.5	91	0
A6099	**15348**	69	0	0	4.2	259.7	92	0
A6099	**15351**	72	0	0	4.3	264	95	1
A6099	**16015**	29	0	0	1.8	265.8	96	1
A6099	**16022**	7	0	0	4.4	270.2	98	0
A6099	**16026**	11	0	0	4.3	274.5	100	0
A6099	**16028**	13	0	0	2.6	277.1	101	1
A6099	**16032**	4	0	0	6.5	283.6	102	0
A6099	**16034**	6	0	0	5.8	289.4	104	0
A6099	**16036**	8	0	0	4.9	294.3	106	0
A6099	**16040**	12	0	0	6.9	301.2	108	0
A6099	**16042**	14	0	0	6.3	307.5	110	1
A6099	**16047**	5	0	0	5.6	313.1	112	0
A6099	**16049**	7	0	0	6	319.1	114	0
A6099	**16054**	12	0	0	5.4	324.5	116	0
A6099	**16056**	14	0	0	2.3	326.8	117	0
A6099	**16130**	88	0	0	3.2	330	118	1
A6099	**16132**	3	0	0	9.4	339.4	121	1
A6099	**16139**	10	0	0	4.4	343.8	122	0
A6099	**16141**	12	0	0	3.5	347.3	124	0
A6099	**16154**	25	0	0	7.7	355	126	1
A6099	**16173**	19	0	0	8.6	363.6	129	0
A6099	**16175**	21	0	0	4.8	368.4	130	1
A6099	**16186**	11	0	0	3.3	371.7	131	1
A6099	**16188**	2	0	0	0.8	372.5	132	1
A6099	**16190**	2	0	0	2	374.5	133	1
A6099	**16229**	41	0	0	5.6	380.1	134	1
A6099	**16235**	6	0	0	1.9	382	135	1
A6102	**13346**	56	0	0	8	8	3	1
A6102	**13352**	6	0	0	5.5	13.5	5	0
A6102	**14007**	26	0	1	2.4	15.9	6	1
A6102	**14013**	6	0	0	6.7	22.6	8	0
A6102	**14015**	8	0	0	8.3	30.9	11	0
A6102	**14017**	10	0	0	5	35.9	13	1
A6102	**14035**	18	0	0	16.2	52.1	14	0
A6102	**14037**	20	1	0	12.7	64.8	15	0

A6102	**14038**	21	1	0	12.9	77.7	16	0
A6102	**14039**	22	1	0	9.6	87.3	17	0
A6102	**14041**	24	1	0	12.1	99.4	18	0
A6102	**14043**	26	1	0	12.4	111.8	19	0
A6102	**14044**	27	1	0	11.9	123.7	20	0
A6102	**14046**	29	1	0	12.6	136.3	21	0
A6102	**14048**	31	1	0	12.2	148.5	22	0
A6102	**14050**	33	0	0	16.4	164.9	24	0
A6102	**14052**	35	1	0	12.2	177.1	25	0
A6102	**14053**	36	1	0	10.4	187.5	26	0
A6102	**14056**	39	1	0	12.5	200	27	0
A6102	**14058**	41	1	0	12.8	212.8	28	0
A6102	**14059**	42	1	0	12.1	224.9	29	0
A6102	**14061**	44	1	0	13	237.9	30	0
A6102	**14062**	45	1	0	12.5	250.4	31	0
A6102	**14063**	46	1	0	12.6	263	32	0
A6102	**14068**	51	1	0	13.2	276.2	33	0
A6102	**14069**	52	1	0	12	288.2	34	0
A6102	**14070**	53	1	0	12.4	300.6	35	0
A6102	**14071**	54	1	0	12.2	312.8	36	0
A6102	**14073**	56	1	0	12.4	325.2	37	0
A6102	**14075**	58	1	0	13.5	338.7	38	0
A6102	**14076**	59	1	0	12.2	350.9	39	0
A6102	**14079**	62	1	0	12.7	363.6	40	0
A6102	**14082**	65	1	0	12.7	376.3	41	1
A6102	**14083**	1	1	0	11.7	388	42	0
A6102	**14085**	3	1	0	10.8	398.8	43	0
A6102	**14086**	4	1	0	12.3	411.1	44	1
A6102	**14088**	2	1	0	13	424.1	45	0
A6102	**14089**	3	1	0	12.2	436.3	46	0
A6102	**14090**	4	1	0	12.2	448.5	47	0
A6102	**14094**	8	1	0	13.7	462.2	48	0
A6102	**14101**	15	1	0	12.5	474.7	49	0
A6102	**14103**	17	1	0	13.4	488.1	50	0
A6102	**14105**	19	1	0	12.5	500.6	51	0
A6102	**14108**	22	1	0	12.4	513	52	1
A6102	**14111**	3	1	0	12.8	525.8	53	1

A6102	**14127**	16	1	0	10.3	536.1	54	0
A6102	**14128**	17	1	0	13.3	549.4	55	0
A6102	**14140**	29	1	0	10.6	560	56	0
A6102	**14144**	33	1	0	9.7	569.7	57	0
A6102	**14154**	43	1	0	13.3	583	58	1
A6102	**14165**	10	1	0	12.4	595.4	59	0
A6102	**14169**	14	1	0	12.6	608	60	0
A6102	**14170**	15	1	0	11	619	61	0
A6102	**14173**	18	1	0	12.5	631.5	62	1
A6102	**14177**	4	1	0	11.2	642.7	63	0
A6102	**14179**	6	1	0	12.2	654.9	64	0
A6102	**14185**	12	1	0	6.1	661	65	1
A6102	**14186**	13	1	0	7.8	668.8	66	0
A6102	**14187**	14	1	0	11.3	680.1	67	0
A6102	**14189**	15	0	1	18.1	698.2	68	1
A6102	**14323**	134	0	1	1.7	699.9	69	1
A6102	**15028**	70	0	0	5.2	705.1	70	1
A6102	**15035**	77	0	0	11.3	716.4	73	1
A6102	**15042**	7	0	0	6.8	723.2	74	0
A6102	**15044**	9	0	0	4.6	727.8	76	0
A6102	**15055**	20	0	0	4	731.8	77	1
A6102	**15061**	6	0	0	5.1	736.9	79	0
A6102	**15063**	8	0	0	5.8	742.7	81	1
A6102	**15064**	9	0	0	4.2	746.9	81	0
A6102	**15065**	10	0	0	2.9	749.8	81	0
A6102	**15069**	14	0	0	3.3	753.1	82	1
A6102	**15071**	2	0	0	3.2	756.3	83	0
A6102	**15072**	3	0	0	3.2	759.5	84	0
A6102	**15072**	4	0	0	1.6	761.1	85	0
A6102	**15076**	8	0	0	9.8	770.9	87	1
A6102	**15090**	14	0	0	5.3	776.2	88	0
A6102	**15097**	21	0	0	7.1	783.3	89	0
A6102	**15099**	23	0	0	6.6	789.9	90	0
A6102	**15104**	28	0	0	15.6	805.5	91	0
A6102	**15106**	30	0	0	9.2	814.7	94	0
A6102	**15111**	35	0	0	7.5	822.2	96	0
A6102	**15117**	41	0	0	5.5	827.7	97	0

A6102	**15119**	43	0	0	11.5	839.2	99	0
A6102	**15121**	45	0	0	6.1	845.3	100	0
A6102	**15125**	49	0	0	11.9	857.2	102	0
A6102	**15127**	51	0	0	10.5	867.7	104	0
A6102	**15128**	52	0	0	4.8	872.5	105	1
A6102	**15131**	55	0	0	4.7	877.2	106	0
A6102	**15133**	57	0	0	10.4	887.6	108	0
A6102	**15135**	59	0	0	4.5	892.1	109	1
A6102	**15139**	4	0	0	3.2	895.3	110	1
A6102	**15146**	11	0	0	2.4	897.7	112	0
A6102	**15148**	13	0	0	1.9	899.6	113	1
A6102	**15161**	13	0	0	4.1	903.7	114	1
A6102	**15175**	27	0	0	8.3	912	116	1
A6102	**15209**	34	0	0	6.1	918.1	118	0
A6102	**15224**	49	0	0	3.8	921.9	119	0
A6102	**16236**	61	0	0	4.9	926.8	121	0
A6102	**16243**	68	0	0	4.3	931.1	123	1
A6102	**16265**	90	0	0	1.6	932.7	124	1
A6102	**16271**	96	0	0	2.5	935.2	126	1
A6104	**14119**	12	0	0	8.1	8.1	2	1
A6104	**14121**	14	0	0	2.7	10.8	3	1
A6104	**14125**	18	0	0	7.7	18.5	5	0
A6104	**14127**	20	0	0	2	20.5	6	0
A6104	**14128**	21	0	0	9.3	29.8	8	1
A6104	**14141**	34	0	0	2.3	32.1	9	0
A6104	**14147**	40	0	0	7.6	39.7	11	1
A6104	**14149**	42	0	0	2.1	41.8	12	0
A6104	**14153**	46	0	0	2.4	44.2	13	0
A6104	**14155**	48	0	0	7.1	51.3	14	1
A6104	**14157**	2	0	0	6.2	57.5	15	1
A6104	**14160**	3	0	0	3.2	60.7	16	1
A6104	**14162**	2	0	0	4.6	65.3	17	1
A6104	**14164**	4	0	0	5.1	70.4	19	1
A6104	**14177**	17	0	0	7.7	78.1	21	1
A6104	**14181**	21	0	0	7.4	85.5	23	1
A6104	**14183**	23	0	0	1.4	86.9	24	1
A6104	**15117**	299	0	0	4.5	91.4	25	0

A6104	**15131**	313	0	0	9.5	100.9	27	0
A6104	**15133**	315	0	0	4.7	105.6	28	1
A6104	**15139**	6	0	0	4	109.6	29	0
A6104	**15153**	20	0	0	2.3	111.9	30	0
A6104	**15154**	21	0	0	3.8	115.7	31	0
A6104	**15155**	22	0	0	7.8	123.5	33	0
A6104	**15156**	23	0	0	5	128.5	35	0
A6104	**15159**	26	0	0	2.9	131.4	36	1
A6104	**15163**	4	0	0	1.5	132.9	37	0
A6104	**15166**	7	0	0	5.3	138.2	38	0
A6104	**15182**	23	0	0	9.5	147.7	40	0
A6104	**15201**	42	0	0	1.4	149.1	41	0
A6104	**15237**	78	0	0	4.4	153.5	43	1
A6104	**15259**	22	0	0	9.7	163.2	46	0
A6104	**15261**	24	0	0	5.4	168.6	48	0
A6104	**15265**	28	0	0	8.4	177	50	0
A6104	**15267**	30	0	0	10.6	187.6	53	1
A6104	**15280**	43	0	0	9.3	196.9	56	0
A6104	**15281**	44	0	0	7.2	204.1	58	0
A6104	**15287**	50	0	0	4.7	208.8	60	0
A6104	**15292**	55	0	0	7	215.8	62	1
A6104	**15293**	1	0	0	0.5	216.3	63	1
A6104	**15296**	3	0	0	4	220.3	64	0
A6104	**15300**	7	0	0	2.4	222.7	65	1
A6104	**15302**	2	0	0	4.4	227.1	67	0
A6104	**15313**	13	0	0	5.5	232.6	69	0
A6104	**15316**	16	0	0	6.5	239.1	71	1
A6104	**15322**	6	0	0	7.4	246.5	73	1
A6104	**16008**	51	0	0	4.2	250.7	75	0
A6104	**16011**	54	0	0	6.3	257	77	0
A6104	**16013**	56	0	0	7	264	79	0
A6104	**16015**	58	0	0	1.9	265.9	80	0
A6104	**16025**	68	0	0	3.6	269.5	81	0
A6104	**16027**	70	0	0	2.4	271.9	82	1
A6104	**16055**	98	0	0	6.1	278	84	0
A6104	**16057**	100	0	0	3.1	281.1	85	1
A6104	**16102**	45	0	0	4.7	285.8	86	1

A6104	**16104**	2	0	0	2.2	288	87	1
A6104	**16106**	2	0	0	3.1	291.1	88	1
A6104	**16110**	4	0	0	1.7	292.8	89	0
A6104	**16112**	6	0	0	6.7	299.5	91	1
A6104	**16181**	69	0	0	4.3	303.8	92	1
A6104	**16193**	81	0	0	3.6	307.4	94	1
A6104	**16195**	2	0	0	2.6	310	95	1
A6104	**16221**	28	0	0	16	326	69	0
A6104	**16227**	34	0	0	3.4	329.4	70	1
A6104	**16229**	36	0	0	9.4	338.8	71	0
A6104	**16234**	41	0	0	3.5	342.3	72	0
A6104	**16235**	42	0	0	3.2	345.5	73	1
A6104	**16250**	15	0	0	3.2	348.7	74	1
A6104	**16258**	8	0	0	7.4	356.1	76	0
A6104	**16261**	11	0	0	3	359.1	77	1
A6104	**16265**	4	0	1	9.6	368.7	78	0
A6104	**16266**	5	0	0	2.4	371.1	79	1
A6104	**16269**	8	0	0	3.5	374.6	80	1
A6104	**16271**	2	0	0	8.9	383.5	81	0
A6104	**16311**	42	0	0	4.9	388.4	83	0
A6104	**16312**	43	0	0	7.4	395.8	85	0
A6104	**16313**	44	0	0	4.2	400	86	0
A6104	**16315**	46	0	1	6	406	87	0
A6104	**16318**	49	0	0	1.9	407.9	88	1

Appendix B: R Commands and Results

```
> mydata <-
read.csv("C:/Users/…/Documents/Frailty/B1B_FHRS_Frailty_2.csv")
> attach(mydata)
> library(survival)
> Cox1<-coxph(Surv(C_Sorties, Failure ~ CombatM + FHRS_BF +
Flight_HRS + Lag1_FHRS, data = mydata)
> summary(Cox1)
Call:
coxph(formula = Surv(C_Sorties, Failure) ~ CombatM + FHRS_BF +
    Flight_HRS + Lag1_FHRS, data = mydata)

  n= 1953, number of events= 682

               coef exp(coef)  se(coef)      z Pr(>|z|)
CombatM     0.079166  1.082384  0.119857  0.661  0.50893
FHRS_BF    -0.004106  0.995902  0.001501 -2.736  0.00621 **
Flight_HRS -0.066993  0.935201  0.013232 -5.063 4.13e-07 ***
Lag1_FHRS   0.006732  1.006755  0.012413  0.542  0.58756
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

           exp(coef) exp(-coef) lower .95 upper .95
CombatM       1.0824     0.9239    0.8558    1.3690
FHRS_BF       0.9959     1.0041    0.9930    0.9988
Flight_HRS    0.9352     1.0693    0.9113    0.9598
Lag1_FHRS     1.0068     0.9933    0.9826    1.0315

Concordance= 0.627  (se = 0.013 )
Rsquare= 0.033   (max possible= 0.99 )
Likelihood ratio test= 64.74  on 4 df,   p=2.925e-13
Wald test            = 61.62  on 4 df,   p=1.321e-12
Score (logrank) test = 62.52  on 4 df,   p=8.555e-13
```

```
> Frailty1.Cox <- coxph(Surv(C_Sorties, Failure ~ CombatM +
FHRS_BF + Flight_HRS + Lag1_FHRS + frailty(ID), data=mydata)
> summary(Frailty1.Cox)
Call:
coxph(formula = Surv(C_Sorties, Failure) ~ CombatM + FHRS_BF +
    Flight_HRS + Lag1_FHRS + frailty(ID), data = mydata)

  n= 1953, number of events= 682


            coef      se(coef) se2      Chisq  DF    p
```

```
CombatM      0.616284 0.132928 0.132621  21.49  1.00 3.5e-06
FHRS_BF     -0.002126 0.001489 0.001488   2.04  1.00 1.5e-01
Flight_HRS  -0.068339 0.013402 0.013399  26.00  1.00 3.4e-07
Lag1_FHRS    0.006806 0.012953 0.012950   0.28  1.00 6.0e-01
frailty(ID)                             880.80 15.15 0.0e+00

           exp(coef) exp(-coef) lower .95 upper .95
CombatM       1.8520     0.5399    1.4272    2.4032
FHRS_BF       0.9979     1.0021    0.9950    1.0008
Flight_HRS    0.9339     1.0707    0.9097    0.9588
Lag1_FHRS     1.0068     0.9932    0.9816    1.0327

Iterations: 8 outer, 44 Newton-Raphson
     Variance of random effect=0.991288  I-likelihood = -4300.9
Degrees of freedom for terms=  1.0  1.0  1.0  1.0 15.2
Concordance= 0.689  (se = 0.013 )
Likelihood ratio test= 414.6  on 19.15 df,   p=0


> Cox1$loglik
[1] -4468.748 -4436.381
> Frailty1.Cox$loglik
[1] -4468.748 -4261.436
>


> Frailty6.Cox<-coxph(Surv(C_Sorties, Failure ~ CombatM + FHRS_BF
+ Flight_HRS + Lag1_FHRS + frailty(ID), data=mydata)
> summary(Frailty6.Cox)
Call:
coxph(formula = Surv(C_Sorties, Failure) ~ CombatM + FHRS_BF +
    Flight_HRS + Lag1_FHRS + frailty(ID), data = mydata)

  n= 410, number of events= 125

             coef      se(coef) se2      Chisq DF   p
CombatM      2.208591 0.322646 0.322298 46.86 1.00 7.6e-12
FHRS_BF      0.001772 0.002499 0.002499  0.50 1.00 4.8e-01
Flight_HRS  -0.075812 0.027180 0.027174  7.78 1.00 5.3e-03
Lag1_FHRS   -0.005926 0.027930 0.027924  0.05 1.00 8.3e-01
frailty(ID)                              0.17 0.06 4.2e-01

           exp(coef) exp(-coef) lower .95 upper .95
CombatM       9.1029     0.1099    4.8366   17.1323
FHRS_BF       1.0018     0.9982    0.9969    1.0067
Flight_HRS    0.9270     1.0788    0.8789    0.9777
Lag1_FHRS     0.9941     1.0059    0.9411    1.0500
gamma:1       0.9898     1.0103    0.9224    1.0621
gamma:12      1.0102     0.9899    0.9421    1.0832
```

```
Iterations: 5 outer, 15 Newton-Raphson
     Variance of random effect=0.001321009 I-likelihood = -570.8
Degrees of freedom for terms= 1.0 1.0 1.0 1.0 0.1
Concordance= 0.604  (se = 0.032 )
Likelihood ratio test= 56.7  on 4.06 df,   p=1.559e-11
```

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14. ABSTRACT

During the 2017 posture statement to the US Senate Armed Services Committee, the Secretary of the Air Force and Chief of Staff of the Air Force stated the Air Force suffers from shrinking aircraft inventory, aging aircraft fleets, and flying beyond expected service life. These trends are not exception to the B-1B Lancer, which has been in service since 1986. Recently, the B-1B Lancer has maintained the lowest mission capable (MC) rates, 47.7 percent. The purpose of this research is to explore the failure rates of the B-1B Lancer using survival analysis that could help better understand the failure behavior of the B-1B Lancer. A Cox proportional hazards regression model with frailty confirms the existence of unobserved heterogeneity or frailty in our analysis. When the frailty is controlled, combat missions increase failure rates. Other variables, mainly flight hour or sortie duration related variables, are inconclusive and require further analysis. This study proposes insights based on findings and suggests future research directions.

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