

For parts A-D, use the following set where X and Y are missing values. Answer each part independently of each other part.

{35, 41, 45, 50, 50, 58, 62, 68, 72, X , Y }

A: Suppose that the mean is 60, what is the value of $X+Y$?

B: What is the minimal value of the range of the data set?

C: Suppose that the data set is unimodal, what is the average of the data set's potential modes? Round to 3 decimal places.

D: Suppose that $35 < X \leq Y < 72$, $X \neq Y$, and both X and Y are perfect squares. Find the average of the potential population standard deviations of the set. Round to 3 decimal places.

Find **A+B+C+D** as a decimal

For parts A-D, fill in the blank with the appropriate statistical term and then calculate the number of distinct permutations of the letters in the word of that statistical term. For example, if the answer is CAT, then the answer for that part would be 6. Ignore any and all capitalizations.

A: In a(n) _____ random sample, the first person is selected at random from near the beginning of a list of all members of the population. Then, every kth person is sampled after that.

B: When observing data points in a scatterplot that is fit with a least squares regression line (LSRL), a(n) _____ data point in the scatterplot is any point that, if removed, changes the value of the correlation and/or the slope of the LSRL substantially. Such points are often outliers as well.

C: A graph known as a _____ shows two numeric values as ordered pairs for each bivariate observation, one corresponding to the value of the x-variable and one corresponding to the value of the y-variable.

D: The _____ of a data set is the sum of all the data divided by the number of entries in the data set.

Find $\frac{AC}{BD}$

A: Given that a binomial distribution has $n = 10$ and $p = 0.2$ where n is the number of trials and p is the probability of success, find the sum of the expected value and the variance of the distribution.

B: Given that a binomial distribution has $n = 10$ and $p = 0.2$ where n is the number of trials and p is the probability of success, find the probability of obtaining exactly 7 failures in the 10 trials. Round to 1 decimal place.

C: Given that X is a geometric distribution has $p = 0.2$ where p is the probability of success, find the expected value of the square of the distribution. That is, find $E(X^2)$.

D: Given that a geometric distribution has $p = 0.2$ where p is the probability of success, find the probability of succeeding on the 3rd attempt.

Find **A+B+C+D**

For parts A-D, use the following data.

{11, 13, 18, 19, 21, 22, 22, 22, 23, 24, 26, 28, 30, 45, 61}

A: Let the answer to this part equal 10 if the data set is skewed to the right. Let the answer to this part be equal to 100 if this data set is skewed to the left. If neither are true, let the answer to this part be equal to 1000.

B: Find the product of the upper fence and lower fence when using the 1.5IQR rule. In other words, find the product of the maximum and minimum value a data value can take without being considered an outlier using the 1.5IQR rule.

C: Find the sum of the outliers of the data set using the 1.5IQR rule. If there are no outliers, the answer to this part is 0. If there is only one outlier, that value is the answer to this part.

D: Find the sum of the numbers in the 5-number summary of the data set.

Find **A+B+C+D**

There is a total of 120 students in the MAO chapter at DBHS. They can take Spanish, French, or Japanese language classes. 60 students take Spanish, 50 take French, and 20 take Japanese. 12 take Spanish and French only, 4 take French and Japanese only, and 2 take Spanish and Japanese only. Only 2 students take all 3 language classes. **Answer each part as a fraction.**

A: What is the probability of selecting a student that does not take French, Japanese, or Spanish?

B: What is the probability of selecting a student that only takes exactly 1 language class?

C: What is the probability of selecting a student that takes multiple language classes given that they take at least 1 language class?

D: What is the probability of selecting a student that takes Japanese given that they take Spanish?

Find **A+B+C+D** as a fraction

Mr. Snow decides to randomly poll a SRS of 41 out of the thousands of students from his morning classes over the years and a SRS of 35 students out of the thousands of students from his afternoon classes over the years and asks his students if they think that he is being an effective teacher. For his morning classes, 32 out of the 41 students said he is being an effective teacher and for his afternoon classes 18 out of the 35 students said he is being an effective teacher. Mr. Snow believes that there is a difference between the perceptions of his teaching efficacy for his morning classes and afternoon classes over the years. You may assume all conditions are met for all parts.

A: Find the sum of the p-value and the absolute value of the test statistic of the 2 proportion Z-test that can be used to calculate the perceptions of Mr. Snow's teaching efficacy. Round to two decimals.

B: Suppose Mr. Snow is conducting the appropriate test at the 5% significance level. Let the answer to this part be equal to 10 if he rejects the null. Let the answer to this part be equal to 100 if he fails to reject the null. If neither are true, let the answer to this part be equal to 1000.

C: How many tails are included for the appropriate test?

D: Suppose Mr. Snow constructs a 95% confidence interval for the difference between the two parameters of interest in order to see if he can reject the same null hypothesis from above. He calculates the interval to be (a, b) where $|a| \leq |b|$. Give the value of a if he rejects the null. Give the value of b if he fails to reject the null. If neither are true, give the value of ab . Round to two decimals.

Find **ABCD**

Die X is a fair 6-sided die labeled from 1-6. Die Y is an unfair 6-sided die labeled from 1-6 where the probability of rolling a number k is twice as likely than rolling a number $k - 1$.

A: Find the value of $E(X) + E(Y) + E(XY)$.

B: Find $P(X \geq Y - 1)$.

C: Find $P(X = Y)$.

D: Suppose a die is chosen at random, what is the probability that the die rolled shows a prime number?

Find **A+B+C+D**

Clownboy is suspicious that the amount of Fritos chips in an average Frito bag is actually less than advertised by the Fritos company. The Fritos company advertises that there is a mean of 160 grams worth of Fritos chips in a bag. Clownboy decides to take an SRS of 144 Frito bags and finds that the mean grams were 155 with standard deviation 36 grams.

- A:** Find the sum of the p-value and test statistic of the appropriate test. Round to 2 decimals.
- B:** Suppose Clownboy is testing at the 1% significance level. Let the answer to this part equal 10 if he rejects the null. Let the answer to this part equal 100 if he fails to reject the null. If neither are true, let the answer to this part equal 1000.
- C:** How many tails are included in the appropriate test?
- D:** What is the value of the standard error used to calculate the appropriate test statistic? Round to 2 decimals.

Find **ABCD**

For parts A-D, there is a bag with 5 white marbles, 5 blue marbles, and 5 red marbles. Vedant picks a marble at random, then notes its color, and then put back into the bag.

A: What is the probability of randomly selecting 3 red marbles in a row?

B: What is the probability of randomly selecting a white marble, a blue marble, and a red marble in any order?

C: What is the probability of selecting 5 marbles and none of them are red?

D: Suppose that k purple marbles are added into the bag and suppose that Vedant will continue randomly selecting a marble (again, with replacement) until he notes a purple marble. He calculates that the average number of times he has to randomly select a marble until he notes a purple marble is $\frac{5}{2}$. Find the value of k .

Find $\frac{CD}{AB}$

Anna is curious about the linear relationship between a student's grade in Mr. Snow's statistics class and how many hours they play League of Legends in a given week. She randomly asks 11 students and finds the following (x,y) pairs where x is the student's grade, and y is the student's hours played in a given week.

Data: $(82, 0)$, $(71, 1)$, $(87, 1)$, $(75, 2)$, $(85, 4)$, $(89, 6)$, $(87, 6)$, $(90, 7)$, $(92, 8)$, $(98, 12)$, $(100, 24)$

A: Without actually creating a LSRL, the point (a, b) must lie on the LSRL. Find the value of $a + b$.

B: Find the sum of the slope, coefficient of determination, and the y-intercept of the LSRL. Round to 2 decimals.

C: Thiago, who was not polled by Anna, has a 79 in Mr. Snow's statistics class. Based on the LSRL where the slope and y-intercept are rounded to 2 decimals, what is his predicted number of weekly hours of League of Legends that he would play? Round to the nearest hour.

D: Find the residual of the point $(100,24)$ based on the LSRL where the slope and y-intercept are rounded to 2 decimals.

Find **A+B+C+D**

Mr. Snow is testing how Frito chip consumption affects scores in MAO competitions. He predicts that eating Fritos will increase scores and that eating even more Fritos will increase scores even more. He decides to randomly assign 30 DBHS competitors equally to the following groups: {1 bag of Fritos, 3 bags of Fritos, 5 bags of Fritos, 10 bags of Fritos, No Fritos}.

A: The number of factors and levels in Mr. Snow's experiment can be written as α and δ respectively. Find the value of $2\alpha + 3\beta$.

B: How many participants are given each treatment?

C: Suppose that the mean MAO score for those that ate 1 bag Classic Fritos is 65 with standard deviation 10 and that those that ate no Fritos is 55 with standard deviation 6. The p-value of the appropriate test statistic rounded to 2 decimals can be written as x . If Mr. Snow rejects the null at the 5% significance level, find x . Otherwise, find $2x$. Assume all conditions are met and you must use your calculator program and the "exact" degrees of freedom to perform the test.

D: Now suppose that the mean MAO score for those that ate 10 bags of Classic Fritos is a 61 with standard deviation 8. Comparing this with the 1 bag Classic Fritos data in part C, the p-value of the appropriate test statistic rounded to 2 decimals can be written as y . Mr. Snow rejects the null at the 5% significance level, find y . Otherwise, find $2y$. Assume all conditions are met and you must use your calculator program and the "exact" degrees of freedom to perform the test.

Find **A+B+C+D**

Ms. Lambert loves geometry. In fact, she loves it so much that she has a semi-circular pdf (probability density function) over the domain $[0, x]$.

A: Find the exact value of x .

B: Find the exact value of the median.

C: Find the exact value of the mean.

D: What is the exact value of the mode of the pdf?

Find $(A + B + D)C\pi$

Mr. Otto has just given a calculus exam to his students. The mean of the scores is a 78 with variance 36. Mr. Otto decides to curve the exam by altering the standard deviation to 9 and then giving every student an extra 5 points. Assume that the scores follow a normal distribution and that students can get a score over 100.

A: The transformation equation can be written in the form $y = \alpha x + \beta$. Find the value of the expression $2\alpha + 3\beta$.

B: Maverick got a 92 before the curve. Let the value of his score after the curve rounded to the nearest integer be equal to δ . Oshmita got an 81 after the curve. Let the value of her score before the curve was applied rounded to the nearest integer ϵ . Find $2\delta - 3\epsilon$.

C: Find the value of the mean of the scores of the calculus exams after the curve.

D: Suppose that Mr. Otto wants the mean scores of the calculus exams after the curve to be an 85 with the same standard deviation of 9. So, instead of adding the 5 extra points he adds k extra points to each calculus exam. Find the value of $2k$.

Find **A+B+C+D**

Mr. Snow has just given an exam where the mean is an 82 with standard deviation 9. Assume that the distribution of the exam scores are approximately normal.

A: Shiv scored a 100 on the exam. Find the value of his z-score.

B: Austin knows that his z-score is $\frac{7}{9}$. Find the value of his raw score.

C: Khushi scored at the 90th percentile. Find the value of her raw score. Round to the nearest integer.

D: Duncan scored a 97. Calculate his percentile to the nearest percent. For example, if he scored at the 20th percentile, the answer to this part is 20.

Find **A+B+C+D**

For parts A-D, use the following stem and leaf plot:

Stem	Leaf
2	0 0 2 3 4 6 7 9
3	0 1 1 1 2 5 7 7 8 9 9
4	2 3 5 6 9
5	1 1 2 7 9 9

Where 2|0 represents 20.

A: Find the value of the mean of the distribution.

B: Find the value of the standard deviation of the distribution. Round to 2 decimals.

C: Find the mode of the distribution.

D: Find the median of the distribution.

Find $100(A + B + C + D)$