
QUESTION 1

The following set of sampled data contains 16 values:

12.0	38.6	24.8	9.9	15.6	23.3	30.7	27.3
22.5	17.6	18.4	8.2	28.6	32.2	14.4	11.6

A = mean of the set

B = standard deviation of the set

C = interquartile range of the set

D = height of a uniform density curve which has a length equal to the range of the set

Round each answer to 4 decimal places, and find $A + B + C + D$.

QUESTION 2

A : Dr. Krieger finds pairs of identical twins from randomly selected families around the world. He takes one of each pair of twins and injects illegal drugs into their bloodstream. He then measures the anatomic blood pressure of each pair of twins. The blood pressures of the treated twins are 94, 92, 85, 82, 86, 100, and the blood pressures of the corresponding normal twins are 86, 81, 89, 86, 83, 92. Find the t -statistic for whether the blood pressure of the treated twins is greater than that of their normal twins. Assume all experimental conditions are met.

B : John and Juan each ask 100 randomly selected citizens of their individual cities whether they support the newly elected governor. John finds that 81 of his 100 support the governor, while Juan finds that 44 of his 100 support the governor. Find the positive z -statistic for whether there is a significant difference in the proportions of the two data samples. Assume all experimental conditions are met.

Round each answer to 4 decimal places, and find $A + B$.

QUESTION 3

The following is a table of voter party preference by gender from some city:

	Republican	Democrat	Independent	Row Total
Male	700	500	300	1500
Female	500	600	400	1500
Column Total	1200	1100	700	3000

Find χ^2 , the chi-square value of the independence between gender and party preference, using the data above. (Round your final answer to 2 decimal places).

QUESTION 4

Tyler Herro of the Miami Heat is shooting free throws in practice. He makes 93.5% of all free throw attempts he takes. (round all steps and answers to 4 decimals).

A: If he wins \$1 from every made shot and loses \$10 from missed shot, what is his expected net dollar gain after 8 free throw attempts?

B: Herro loses all his money, so Jimmy Butler challenges Herro to make two consecutive free throws. If he makes those free throws, then Butler will shoot two of his own. If Butler, who makes 83.5% of all free throw attempts he takes, cannot make both of his free throws, then Herro wins \$5. If Herro cannot make both of his free throws or Butler makes both of his, then Herro loses \$2. What is Herros expected net dollar gain?

C: Herro, penniless and proud, still believes he is worthy. So, he challenges Butler to see who has the higher free throw percentage after 11 attempted shots each. What is the probability that Butler has the higher free throw percentage after the 11 free throws? (assume normality of shot distributions).

Find $(A + B) - C$.

QUESTION 5

The time it takes for American high school students to complete their homework is normally distributed with a mean of 189 minutes and a standard deviation of 60 minutes.

A = the proportion of American high school students who complete their homework within 2 and 3 hours

B = the probability that none of the individuals in a simple random sample of 9 American high school students have a homework completion time within 2 and 3 hours

C = the probability that a simple random sample of 9 American high school students has a mean homework completion time within 3 hours and 4 hours

Round each of your answers to 4 decimal places and solve for $A + B + C$.

QUESTION 6

Beginning with 2019, add 11 for each true statement and subtract 16 for each false statement.

- Stemplots, histograms, box plots, bar graphs, and scatter plots are all examples of graphs used for quantitative data.
- Central Limit Theorem states that as the sample size tends to infinity, the distribution of the sample means approaches the Normal distribution.
- Geometric, negative binomial, and χ^2 distributions are skewed right.
- Hawthorne effect occurs when people modify their behavior because they are aware that they are being observed.
- Law of Large Numbers states that as the sample size tends to infinity, the center of the distribution approaches the true population mean.
- If two events are mutually exclusive, then they must also be independent.
- Extrapolation produces accurate predictions only when the coefficient of determination is greater than 0.8.
- A density curve describes the overall pattern of a distribution and must have an area of exactly 1.

QUESTION 7

Martin would like to determine whether there is a linear relationship between the number of eggs laid by a chicken and the weight of the chicken. The data he collected is provided in the table below:

Number of eggs laid by chicken (x)	21	27	17	35	19	24	15	22	26	25
Weight of chicken (y)	680	856	459	1156	756	978	567	732	591	789

- A = the average of the slope and y -intercept of the least-squares regression line
 B = the percent of the variation in the values of y that is not explained by the least-squares regression line of y on x
 C = the residual for $x = 19$
 D = the sum of \bar{x} and \bar{y}

Round each of your answers to 4 decimal places and find $A + B + C + D$.

QUESTION 8

X and Y are two independent, random variables. X has a mean of 30 and standard deviation of 9. Y has a mean of 21 and standard deviation of 4. Let:

A = the mean of $2X + 3Y$

B = the standard deviation of $X + Y$

C = the standard deviation of $X - Y - 10$

D = the standard deviation of $2X + 3Y$

Find $A + B \times C + D$.

QUESTION 9

Let X be a discrete random variable with probability distribution shown below.

X	0	1	2	3	4	5	6	7	8	9
$P(X)$	0.06	0.07	0.12	0.23	0.05	0.06	0.12	0.03	0.10	0.16

Using the information above, let:

$$A = P(X < 7 | X > 3)$$

$$B = P(X < 3 \cup X > 6)$$

$$C = \text{the standard deviation of this distribution}$$

$$D = E(X^2)$$

Round each of your answers to 4 decimal places and find $A + B + C + D$.

QUESTION 10

Kyle and Aditya always end up getting put into jail every Sunday after their Scientology services. Kyle always gets in jail between 4:00 p.m.–8:00 p.m on any Sunday and stays for 2 hours, while Aditya gets in jail between 6:30 p.m - 9:00 p.m on any Sunday and stay for 1.5 hours. Let \mathbf{A} be the probability that they will be at the jail at the same time considering that their schedules are independent and they have an equal probability of getting into jail at any time during the respective times that each person always gets in jail. Dinner is served from 7:00 p.m.–7:30 p.m. every day, and the prisoners simply just have to pick up the food and leave, so for the purpose of this question assume that the time for eating dinner is negligible. Let \mathbf{B} be the probability that both Kyle and Aditya get to eat dinner at jail on any given Sunday.

Andrew and Rayyan have been traveling around the world to eat at as many Michelin Star restaurants as possible for the past 5 years. They turn it into a competition to see who can eat at the most restaurants over time. The following data table contains the number of Michelin Star restaurants that Andrew and Rayyan ate at each month respectively during 2018:

	January	February	March	April	May	June	July	August	September	October	November	December
Rayyan	3	6	4	3	3	0	12	5	5	23	7	5
Andrew	5	7	0	1	1	50	5	5	12	5	5	23

C = the covariance between the number of restaurants that Andrew and Rayyan ate at each month during 2018 rounded to the nearest hundredth

D = the correlation between the number of restaurants that Andrew and Rayyan ate at each month during 2018 rounded to the nearest hundredth

Find $A + B - C - D$.

QUESTION 11

Use the following data points to solve for A and B : $(0, 0)$, $(3, 12)$, $(4, 15)$, $(6, 17)$, $(8, 52)$, $(9, 81)$, $(11, 15)$, $(17, 95)$, $(18, 120)$, $(20, 255)$

A = the correlation value for cubic regression model of the data points rounded to the nearest thousandth

B = the coefficient of determination for the linear regression model of the data points rounded to the nearest thousandth

A random sample has a size of 42. The 42 numbers in the set add up to 190 and the sample variance is 12.05.

C = the sum of the squares of the numbers in the data set rounded to the nearest integer

D = the upper limit of the range that should fall within 50% of the mean given that the distribution of the sample may not be normal rounded to the nearest tenth

Find $10C(A - B) - 5D$.

QUESTION 12

Tanvi recently discovered her passion for dancing and that she is actually better than she thought she was before. She, along with her friend Rayyan decide that they want to participate in a competition called Dance India Dance where two contestants win. The chances that each of them win are related and connected to one another. The probability that Tanvi wins is 0.9, while the probability that Rayyan wins is 0.8. If the probability that Tanvi wins given that Rayyan wins is 0.85, then let \mathbf{A} = the probability that Rayyan wins given that Tanvi wins rounded to the nearest hundredth. Tanvis performance times vary a lot on each occasion. Given that her average time is 186 seconds, the standard deviation of the times is 24 seconds, and the distribution can be assumed as normal, let \mathbf{B} = the probability that Tanvis performance is between 145 and 227 seconds based off of the only the provided information, and expressed as a decimal rounded to the nearest hundredth.

Sanjita tends to be a very happy person who always has a smile on her face. There is a 70% chance that Sanjita will smile more often than not on any given Tuesday, Wednesday, and Thursday; an 87% chance on Friday and Saturday; a 77% chance on Sunday; and only a 32% chance on Monday. Let \mathbf{C} = the expected value of the number of days rounded to the nearest whole day where Sanjita did not smile more often than not during her favorite month, December, where December 1st falls on a Monday.

Find $40(B - A) + C$.

QUESTION 13

The following list of sampling methods are for parts $A - D$ below:

- voluntary sampling
- simple random sampling
- stratified sampling
- cluster sampling
- convenience sampling
- systematic sampling
- multistage sampling
- blocking

Let:

A = the number of the above sampling methods which can employ randomness in the sample selection process

B = the number of the above sampling methods which require sectional divisions

C = the number of the above sampling methods which should be used when generating two equal random samples of men and women

Find $A + B + C$.

QUESTION 14

The results from Dhruv's history class exams form a normal distribution. Apurva scores a 87 on the test and approximately 30.85% of the students in the class score higher than him. Isaiah scores a 60 and approximately 1.39% of the students in the class score lower than him.

Let:

A = the mean score

B = the standard deviation of the scores

Round each of your answers to the nearest whole number and solve for $A + B$.