8. Given the following distribution of returns, determine the lower

quartile:

{10 25 12 21 19 17 16 11 15 19}

Solve = ascending order 10 11 12 15 16 17 19 19 21 25

No of values n=10

the lower quartile= n+1/4 = 10+1/4=2.75

Since 2.75 is not an integer, we need to round up to the nearest whole number to find the position. Therefore, the position is 3.

The lower quartile is the value at the 3rd position in the sorted dataset:

Lower quartile = 12

So, the lower quartile of the given distribution of returns is 12.

9. For a Binomial distribution, the number of trials(n) is 25, and the

probability of success is 0.3. What’s the variability of the

distribution?

Solve- Standard deviation (σ) = √(n \* p \* q)

In this case, n = 25 and p = 0.3.

q= 1-p=1-3/10=7/10=0.7

(σ) = √(25 \* 0.3 \* 0.7)= √(5.25) =2.29 ans

10. Amy has two bags. Bag-I has 7 red and 2 blue balls and Bag-II has

5 red and 9 blue balls. Amy draws a ball at random and it turns out to

be red. Determine the probability that the ball was from the Bag-I

using the Bayes theorem.

Slove- Let X and Y be the events that the ball is from the bag I and bag II, respectively. Since there are 7 red balls out of a total of 11 balls in the bag I, therefore, P(drawing a red ball from the bag I) = P(A|X) = 7/11

Similarly, P(drawing a red ball from bag II) = P(A|Y) = 5/14

Assume A to be the event of drawing a red ball. We know that the probability of choosing a bag for drawing a ball is 1/2,

Using Bayes theorem- =

= [((7/11)(1/2))/(7/11)(1/2)+(5/14)(1/2)]

= 0.64 ANS

11.Find the mean, mode and median of g = [10, 23, 12, 21, 14, 17, 16, 11,

15, 19, 12]

MEAN= 10+11+12+12+14+15+16+17+19+21+23=170/11=15.45

MODE=12 MOST FREQUENTLY NUMBER.

MEDIAN=10,11,12,12,14,15,16,,17,19,21,23( ASCENDING OEDER)

SOLVE=15 THIS IS BETWEEN NUMBER

12. The mean height of a random sample of 100 individuals from a

population is 160. The Standard deviation of the sample is 10. Would

it be reasonable to suppose that the mean height of the population is

165?

SOLVE t = (sample mean - hypothesized population mean) / (sample standard deviation / √n)

Given: Sample mean (x̄) = 160 Sample standard deviation (s) = 10 Hypothesized population mean (μ₀) = 165 Sample size (n) = 100

Plugging in these values, we can calculate the t-value:

t = (160 - 165) / (10 / √100) t = -5 / 1 t = -5

14. Suppose we have 3 cards identical in form except that both sides

of the first card are colored red, both sides of the second card are

colored black, and one side of the third card is colored red and the

other side is colored black. The 3 cards are mixed up in a hat, and 1

card is randomly selected and put down on the ground. If the upper

side of the chosen card is colored red, what is the probability that the

other side is colored black?

ANS - RR     BB       RB

Probability of getting R card  up

= (1/3) .1    + (1/3) (1/2)

= 1/3  + 1/6

= 1/2

Probability of getting R card  up  = 1/3  when red both sides  ( other side = Red)

Probability of getting R card  up  = 1/6  when red one side and black other side ( other side = black)

upper side of the chosen card is colored red,

Hence probability that the other side is colored black =   (1/6) /( 1/2)

=  2/6

= 1/3

**1/3 is the probability that the other side is colored black**

13. In a study, physicians were asked what the odds of breast cancer

would be in a woman who was initially thought to have a 1% risk of

cancer but who ended up with a positive mammogram result (a

mammogram accurately classifies about 80% of cancerous tumors

and 90% of benign tumors.) 95 out of a hundred physicians estimated

the probability of cancer to be about 75%. Do you agree?

SOLVE- + = mammogram result is positive, B = tumor is benign, M = tumor is malignant

Bc = M. We are given P(M) = .01, so P(B) = 1 − P(M) = .99. We are also given the conditional probabilities P(+ | M) = .80 and P(− | B) = .90, where the event − is the complement of +, thus P(+ | B) = .10 Bayes’ formula in this case is

P(M | +) = 0.80 × 0.01/0.80 × 0.01 (0.80 × 0.01 + 0.10 × 0.99)= 0.075ANS

1. According to a study, the daily average time spent by a user on a

social media website is 50 minutes. To test the claim of this study,

Ramesh, a researcher, takes a sample of 25 website users and finds

out that the mean time spent by the sample users is 60 minutes and

the sample standard deviation is 30 minutes.

Based on this information, the null and the alternative hypotheses

will be:

Ho = The average time spent by the users is 50 minutes

H1 = The average time spent by the users is not 50 minutes

Use a 5% significance level to test this hypothesis.

SOLVE = The null and alternative hypotheses for this test are as follows:

Null Hypothesis (H₀): The average time spent by the users on the social media website is 50 minutes. Alternative Hypothesis (H₁): The average time spent by the users on the social media website is not 50 minutes.

To test these hypotheses, we can perform a one-sample t-test. Given that we have the sample mean (60 minutes), the sample standard deviation (30 minutes), and a sample size of 25, we can calculate the t-statistic.

The formula for calculating the t-statistic in this case is:

t = (sample mean - hypothesized mean) / (sample standard deviation / √sample size)

Substituting the values:

t = (60 - 50) / (30 / √25) = 10 / (30 / 5) = 10 / 6 = 1.67

Using a 5% significance level (α = 0.05) and a two-tailed test, we need to compare the calculated t-statistic with the critical t-value.

For a two-tailed test with a significance level of 0.05 and 24 degrees of freedom (sample size - 1), the critical t-value is approximately ±2.064.

Since the calculated t-statistic (1.67) does not exceed the critical t-value of ±2.064, we fail to reject the null hypothesis.

Therefore, based on the provided information, we do not have sufficient evidence to conclude that the average time spent by the users on the social media website is significantly different from 50 minutes at a 5% significance level.

5.For a certain type of computer, the length of time between charges of

the battery is normally distributed with a mean of 50 hours and a

standard deviation of 15 hours. John owns one of these computers

and wants to know the probability that the length of time will be

between 50 and 70 hours.

## SOLVE- μ=50 (mean)

σ=15 (standard\ deviation)

find the probability for 50<x<70

converting the problem in standard form

Z=σ(x−μ)​

for x=50,

Z=0

for x=70,

Z=(70−50)/15=1.33

for finding the probability for 50<x<70

In the standard form 0<z<1.33

using Z-table, the area is equal to 0.4082

7.email detected as spam) is 5%. Now if an email is detected as spam,

then what is the probability that it is in fact a non-spam email?

SOLVE-To determine the probability that an email is a non-spam (ham) email given that it has been detected as spam, we need to use Bayes' theorem. Let's define the following probabilities:

P(H) = Probability of an email being ham (non-spam)

P(S) = Probability of an email being spam

P(S|H) = Probability of an email being detected as spam given that it is a ham email (false positive rate)

P(H|S) = Probability of an email being ham given that it is detected as spam (what we want to find)

According to the problem, P(S|H) = 0.05, which means that the false positive rate is 5%. We can also calculate P(H|S) using Bayes' theorem:

P(H|S) = (P(S|H) \* P(H)) / P(S)

We can rewrite P(S) using the law of total probability:

P(S) = P(S|H) \* P(H) + P(S|~H) \* P(~H)

Since P(H) + P(~H) = 1, we can substitute P(~H) with 1 - P(H):

P(S) = P(S|H) \* P(H) + P(S|~H) \* (1 - P(H))

Now we can substitute P(S) in the formula for P(H|S):

P(H|S) = (P(S|H) \* P(H)) / (P(S|H) \* P(H) + P(S|~H) \* (1 - P(H)))

Given that P(S|H) = 0.05, we need additional information about P(H) and P(S|~H) to calculate the probability P(H|S). Without this information, we cannot determine the exact value.