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.**

**Solution-**

Sample of website users (n)= 25

Mean time spent= 60 minutes

Sample standard deviation (SD)=30 minutes

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

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

|  |  |
| --- | --- |
| Mean | 60 |
| Standard Deviation (SD) | 30 |
| Count | 25 |
| Standard Error Mean (SEM) | 6 |
| Degree of freedom(df) | 24 |
| Hypothesized mean | 50 |
| t-test | 1.666667 |
| p-value | 0.05429 |

Since the p-value is more than the significance level that is 0.20, we have to accept the null hypothesis. So that the average time spent by the users is 50 minutes.

1. **Height of 7 students (in cm) is given below. What is the median? 168 170 169 160 162 164 162.**

**Solution=**

Ascending order of 7 students= 160,162,162,164,168,169,170

It’s even number ,so median is middle value

Median =164 is middle number in this data

1. **Below are the observations of the marks of a student. Find the value of mode. 84 85 89 92 93 89 87 89 92**

**Solution=**

Mode is the value that occurs many times.In this data 89 is occur many times

Mode = 89

1. **From the table given below, what is the mean of marks obtained by 20 students?**

**Solution=**

|  |  |  |
| --- | --- | --- |
| Marks Xi | No of students fi | FiXi |
| 3 | 1 | 3 |
| 4 | 2 | 8 |
| 5 | 2 | 10 |
| 6 | 4 | 24 |
| 7 | 5 | 35 |
| 8 | 3 | 24 |
| 9 | 2 | 18 |
| 10 | 1 | 10 |
| Total | 20 | 132 |

Mean = fiXi/No of students

Mean = 132/20

Mean = 6.6

1. **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.**

**Solution=**

Mean = 50 hours

Standard deviation= 15 hours

The probability of length of time will be between 50 and 70

Mean -SD = 50-15 = 65

1. **Find the range of the following. g = [10, 23, 12, 21, 14, 17, 16, 11, 15, 19]**

**Solution =**

Max number – Min number

23-10 = 13

Range = 13

1. **It is estimated that 50% of emails are spam emails. Some software has been applied to filter these spam emails before they reach your inbox. A certain brand of software claims that it can detect 99% of spam emails, and the probability for a false positive (a non-spame mail 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?**

**Solution =**

Let A = Email is detected as spam

Let B= spam Email

Let B’= Email not a spam

P(B)= 50% = 0.5 , P(B’) =1- P(B)= 0.50

P(A/B) = 99%= 0.99

P(A/B’) =5%= 0.05

Find = we need to find the probability that the probability that the Email is non- spam given that it is detected as spam

By using Baye’s thereom :

P(B’/A)= P (A’B)P(B’)/P(A/B)P(B)+P(A/B’)P(B’)

= 0.05\*0.5/(0.05\*0.5)+(0.99\*0.5)

=0.025/0.52

P(B’/A) = 0.0481

1. **Given the following distribution of returns, determine the lower quartile: {10 25 12 21 19 17 16 11 15 19}**

**Solution =**

Ascending order = 10, 11, 12, 15,16,17,19,19,21, 25 n= 10

Lower quartile = n+1/4= 10+1/4= 2.75th value

Lower quartile= first quartile (25th percentile)

The 25th percentile is 3/4th (0.75) of the way from the second data point (11%)to the 3rd data point (12%)

=11%+ 0.75 \*(12-11)

= 11.75

1. **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?**

**Solution=**

N= 25

P(s)= 0.3

P(q)= 1-0.3 = 0.7

Variability of distribution = n\*p\*q= 25\*0.3\*0.7= 5.25

1. **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.**

**Solution =**

Let H1 be the event of selecting bag-I P(H1)= 1/2

Let H2 be the event of selecting bag-II P(H2)= 1/2

Let A be the event of getting red ball

P(H1/A) = 7/9 P(H2/A) = 5/14

By using Bayes theorem :

P(H1/A)= P(H1)P(A/H1) / P(H1)P(A/H1)+P(H2)P(A/H2)

= 1/2\*7/9 / [1/2\*7/9+1/2\*5/14]

= 7/18 / [7/18+5/28]

=1764/2574

= 0.685

1. **Find the mean, mode and median of g = [10, 23, 12, 21, 14, 17, 16, 11, 15, 19, 12]**

**Solution=**

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

Median = Ascending order = 10,11,12,12,14,15,16,17,19,21,23

Median = middle value = 15

Mode= 12 (occur 2 times)

1. **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?**

**Solution=**

Mean= 160

SD= 10

Hypothesised mean=165

N=100

SEM= 1 = Mean height of the popultion is equal to 165

H1= Mean height of the population is more than 165

Using z-test

Z= mean - µ/SEM

Z= 160-165/1

Z= (-5) , it is not lie in acceptable region

So we reject null hypothesis & accept alternate hypothesis

1. **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?**

**Solution=**

Let P = mammogram result is positive

Let B = tumor is benign

Let M = tumor is maligant

P(M) = 1% = 0.01

P(B) = 1- P(M) = 0.99

P(P/M) = 0.8

P(P’/B) = 0.9

P(P/B)= 1-0.9 = 0.1

**Positive mammogram actually has a tumor**

P(M/P) = P(P/M)P(M) /[ P(P/M)P(M)+P(P/B)P(B)]

0.8\*0.01/ (0.8\*0.01)+(0.1\*0.99)

= 0.0748

=7.48

I don’t agree

1. **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?**

**Solution =**

Let RR = All side red

Let BB= All side black

Let RB= Black and red side

Let R = Upturned side of the chosen side is red

P(R/RB) = 1/2

P(R/RR) = 1

P(R/BB) = 0

P(RR)= 1/3

P(BB) = 1/3

**P(RB/R) =** P(R/RB)P(RB)/P(R/RB)P(RB)+P(R/BB)P(BB)+P(R/RR)P(RR)

= 1/2\*1/3 /[(1/2\*1/3)+(0\*1/3)+(1\*1/3)]

= 1/6 /[1/6+1/3]

=1/3

= O.3333