Q2. Ans

Height of seven students
168, 170, 169, 160, 162, 164, 162.

Median = ?

Sol

Ascending order = ~~160, 162~~

160, 162, 162, 164, 168, 169, 170.

$n = 7$

$$\text{Median} = \left(\frac{n+1}{2}\right)^{th} \text{term}$$

$$\text{Median} = \left(\frac{7+1}{2}\right)^{th} \text{term}$$

$$\text{Median} = \left(\frac{8}{2}\right)^{th} \text{term}$$

$$\text{Median} = 4^{th} \text{ term}$$

$$\boxed{\text{Median} = 164}$$

Q3 Ans

Marks of Students =

84, 85, 89, 92, 93, 89, 87, 89, 92

Mode = Maximum Frequency

Mode = 89 Ans

Q4 Ans

Mean = ?

Marks (x_i)	No. of Students (b_i)	$x_i b_i$
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

$$\text{Mean} = \frac{\Sigma b_i x_i}{\Sigma b_i}$$

$$\text{Mean} = \frac{132}{20} \quad \frac{66}{10}$$

Mean = 6.6 Ans

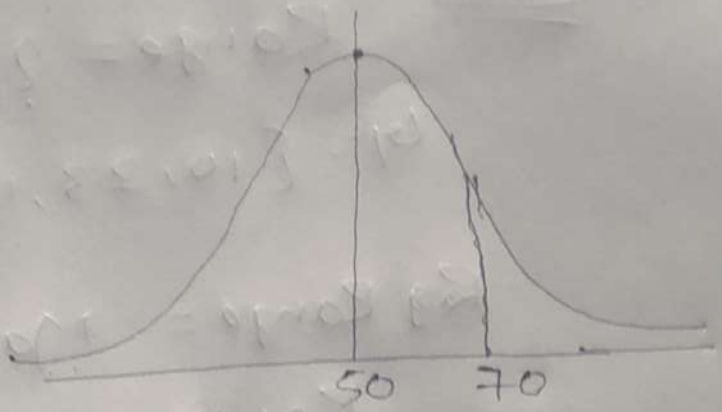
Q5 Ans

given data

$\mu = 50$

$\sigma = 15$

$X = 70$



$$Z = \frac{X - \mu}{\sigma}$$

$$Z = \frac{70 - 50}{15}$$

$$Z = \frac{20}{15} \quad \begin{matrix} 4 \\ 3 \end{matrix}$$

$$Z = \frac{4}{3} = 1.33$$

$$\boxed{Z = 1.33}$$

b/w

$$Z = \frac{X - \mu}{\sigma}$$

$Z =$

Q6 Ans

Range = ?

G = {10, 23, 12, 21, 14, 17, 16, 11, 15, 19}

Range = Max − Min

Range = 23 − 10

Range = 13

Q7 Ans Let

AA denote the event that an email is detected as spam and BB denote the event that an email is spam.

given that 50% of the emails are spam.

i.e $P(B) = 0.5$

thus $P(B') = 1 - P(B)$

$P(B') = 1 - 0.5$

$$\boxed{P(B') = 0.5}$$

A certain brand of software claims that it can detect 99% of spam emails. that is

$$\boxed{P(A/B) = 0.99}$$

the Probability for a false positive (a non spam given that it is detected as spam.

using Bayes theorem

Required Probability

$$P(B'/A) = \frac{P(A/B')\,P(B')}{P(A)}$$

$$P(B'/A) = \frac{P(A/B')\,P(B')}{P(A/B)\cdot P(B) + P(A/B')\cdot P(B')}$$

$$P(B'/A) = \frac{0.05 \times 0.5}{0.05 \times 0.5 + 0.99 \times 0.5}$$

$$P(B'/A) = \frac{0.025}{0.52}$$

$$\boxed{P(B'/A) = 0.0481}$$

f

Q8 Ans

lower quartile = ?

10, 25, 12, 21, 19, 17, 16, 11, 15, 19

Sol First rearrange an Ascending order

10, 11, 12, 15, 16, 17, 19, 19, 21, 25

Total no of observation = 10

lower quartile = 25% of the total No observation

Lower quartile = $\frac{25}{100} \times 10$ 3th term

Lower quartile is Second observation = 12

f

Q9 Ans

No. of trails (n) = 25.

Probability of success = 0.3

The mean of a binomial random variable is given by the number of trials n, multiplied by Probability of success

$$\mu = np$$

$$\text{Mean}(\mu) = 25 \times \frac{0.3}{10_2} = \frac{15}{2}$$

$$\boxed{\mu = 7.5}$$

Variance = npq

$$\text{Variance} = 25 \times \frac{0.3}{10} \times \frac{0.7}{10}$$

$$\text{Variance} = \frac{21}{4}$$

$$\boxed{\text{Variance} = 5.25}$$

$q = 1 - p$

$q = 1 - 0.3$

$\boxed{q = 0.7}$

q = Probability of failure

Standard deviation = $\sqrt{\text{variance}}$

$$S.D = \sqrt{5.25}$$

$$\boxed{S.D = 2.291}$$ f

Q10 Ans

Bag-I = 7(Red), 2(Blue)

Bag-II = 5(Red), 9(blue)

the event of selecting the bag-I is denoted by 'I'

the event of selecting the bag-II is denoted by 'II'

the event of selecting a red ball is denoted by 'R'

$$P(I) = P(II) = \frac{1}{2}$$

$$P(R/II) = \frac{7}{9}, \quad P(R/II) = \frac{5}{14}$$

From Bay's theorem, we get

$$P(II/R) = \frac{P(R/II)\,P(II)}{P(R)}$$

$$P(II/R) = \frac{P(R/II)\cdot P(II)}{P(R/I)\cdot P(I) + P(R/II)\cdot P(II)}$$

$$P(II/R) = \frac{7/9 \times \frac{1}{2}}{\frac{7}{9}\times\frac{1}{2} + \frac{5}{14}\times\frac{1}{2}}$$

$$P(I/R) = \frac{\frac{7}{18}}{\frac{7}{18} + \frac{5}{28}} = \frac{\frac{7}{18}}{\frac{98+45}{252}} = \frac{\frac{7}{18}}{\frac{143}{252}} = \frac{7}{18}\times\frac{252}{143}$$

$$\boxed{P(I/R) = 0.685}$$ Ans

Q.12 Ans

given

$\bar{x} = 160$, $n = 100$, $\mu = 165$, $\sigma = 10$.

$\mu_0 : \bar{x} = \mu$; $\mu_2 = \bar{x} \pm \mu$

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$$

$$z = \frac{160 - 165}{10/\sqrt{100}}$$

$$z = -5$$

$$|z| = |-5|$$

$$\boxed{z = 5}$$

the topic value of z at 5% = 1.96

the calculation value of z is greater than the table value.

Hence H_0 is accepted

Q13 Ans

Sol

given

P = mammogram result is positive

B = tumor is benign

M = tumor is malignant

Bay's formula on this case is

$$P(M/P) = \frac{P(P/M) \cdot P(M)}{P(P/M) \cdot P(M) + P(P/B) \cdot P(B)}$$

$$P(M/P) = \frac{0.80 \times 0.01}{0.80 \times 0.01 + 0.10 * 0.99}$$

$$P(M/P) = \frac{0.008}{0.008 + 0.099}$$

$$P(M/P) = 0.075$$

$$\boxed{P(M/P) = 7.5\%}$$ 8

9 Ans given data

RR = All side Rod

$P(RR) = \frac{1}{3}$ & $P(BB) = \frac{1}{3}$

$PR(R/RR) = 1 \quad P(R/BB) = 0$

Using the result we have to find.

$P(RB/R) = ?$

$$P(RB/R) = \frac{P(RB \cap NR)}{P(R)}$$

$$\Rightarrow P(RB/R) = \frac{P(R/RB) \cdot P(RB)}{P(R/RB) \cdot P(RB) + P(R/BB) \cdot P(BB) + P(R/RR) \cdot P(R \cdot R)}$$

$$\Rightarrow P(RB/R) = \frac{\frac{1}{2} \times \frac{1}{3}}{\left(\frac{1}{2} \times \frac{1}{3}\right) + \left(0 \times \frac{1}{3}\right) + \left(1 \times \frac{1}{3}\right)} = \frac{\frac{1}{6}}{\frac{1}{6} + 0 + \frac{1}{3}} = \frac{\frac{1}{6}}{\frac{3}{6}} = \frac{1}{3}$$

$$\boxed{P(RB/R) = \frac{1}{3}}$$ Ans