

Major Assignment (Statistics)

Q₁ $n = 19$

$$x_i = \{ 24, 25, 28, 31, 33, 33, 36, 42, 42, 48, 51, 57, 57, 68, 75, 79, 79, 79, 85 \}.$$

Since, no. of terms (n) are in odd

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

$$\text{median} = \left(\frac{19+1}{2} \right)^{\text{th}} \text{ term}$$

$$\text{median} = (10^{\text{th}}) \text{ term}$$

Ans $\boxed{\text{median} = 48}$

Q₂ $n = 8$

$$x_i = \{ 45, 39, 53, 45, 43, 48, 50, 45 \}$$

$$\text{Mean} = \frac{45 + 39 + 53 + 45 + 43 + 48 + 50 + 45}{8}$$

$$\text{Mean} = \frac{368}{8}$$

Ans $\boxed{\text{Mean} = 46}$

Q3

$$\text{Mean} = \sum_{i=1}^n x_i = \frac{x_1 + x_2 + \dots + x_n}{n}$$

$$(\bar{X})$$

$$\bar{X} = \sum_{i=1}^{n=11} x_{11} = \sum_{i=1}^{n=10} x_{10} + 1500$$

(since, $x_{11} = 1500$)
and

$$\bar{X} = \frac{14450 + 1500}{11}$$

$$\bar{X} = 1450 \quad \text{Ans}$$

$$Q_4 \quad \text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$$

Since, highest frequency is 20. Therefore the corresponding modal class is 150-160.

$$\text{Lower limit} = l = 150$$

$$\text{Size of class interval} = h = 10$$

$$\text{Frequency of modal class} = f_1 = 20$$

$$\text{Frequency of class preceeding} = f_0 = 12$$

$$\text{Frequency of class succeeding} = f_2 = 8$$

$$\text{Mode} = 150 + \left(\frac{20 - 12}{2 \times 20 - 12 - 8} \right) \times 10$$

$$\text{Mode} = 150 + \left(\frac{8}{20} \right) \times 10$$

$$\boxed{\text{Mode} = 154} \quad \text{Ans}$$

Q5

Range = Largest value - Lowest value

$$\text{Range} = 70.08 - 13.67$$

$$\boxed{\text{Range} = 56.41} \text{ Ans}$$

Q6

$$\mu = \frac{17.8 + 19.2 + 16.3 + 12.5 + 12.8 + 11.4}{6}$$

(Mean)

$$\mu = 15$$

x_i	$x_i - \mu$	$(x_i - \mu)^2$
17.8	2.8	7.84
19.2	4.2	17.64
16.3	1.3	1.69
12.5	-2.5	6.25
12.8	-2.2	4.84
11.4	-3.6	12.96

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (x_i - \mu)^2}{n}}$$

$$\sigma = \sqrt{\frac{7.84 + 17.64 + 1.69 + 6.25 + 4.84 + 12.96}{6}}$$

$$\sigma = \sqrt{6.4025}$$

$$\boxed{\sigma = 2.53} \text{ Ans}$$

Q7

$$\mu = 527$$

$$\sigma = 112$$

~~Q7~~ Q7

$$P(X > 500) = (500 - 527) / 112$$

$$P(X > 500) = -0.24$$

$$P(X > 500) = 1 - 0.4052$$

$$P(X > 500) = 0.5948 \quad \text{Ans}$$

$$Q.8) P(x_1 < x < x_2) \quad \mu = 266$$

$$\sigma = 16$$

$$P\left(\frac{240-266}{16} < z < \frac{270-266}{16}\right)$$

$$P\left(\frac{-13}{8} < z < \frac{1}{4}\right)$$

$$P\left(\frac{-13}{8} < z < \frac{1}{4}\right) = -P\left(\frac{-13}{8}\right) + P\left(\frac{1}{4}\right)$$

$$= P\left(\frac{1}{4}\right) - P\left(\frac{-13}{8}\right)$$

$$= P(0.25) - P(-1.625)$$

$$= 0.5987 - 0.0516$$

$$\boxed{P(240 < z < 270) = 0.5471} \quad \text{Ans}$$



Q9

$$x = \{ 10, 50, 30, 20, 10, 20, 70, 30 \}$$

arranging in ascending order

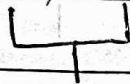
$$x = \{ 10, 10, 20, 20, 30, 30, 50, 70 \}$$

$$\text{Minimum value} = 10$$

$$\text{Maximum value} = 70$$

$$1^{\text{st}} \text{ Quartile} =$$

$$\{ 10, 10, 20, 20 \} \{ 30, 30, 50, 70 \}$$

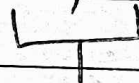


$$\frac{10 + 20}{2} = 15$$

$$1^{\text{st}} \text{ Quartile} = 15$$

$$2^{\text{nd}} \text{ Quartile} =$$

$$\{ 10, 10, 20, 20, 30, 30, 50, 70 \}$$

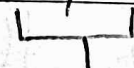


$$\frac{20 + 30}{2} = 25$$

$$2^{\text{nd}} \text{ Quartile} = 25$$

$$3^{\text{rd}} \text{ Quartile} =$$

$$\{ 10, 10, 20, 20 \} \{ 30, 30, 50, 70 \}$$



$$\frac{30 + 50}{2} = 40$$

$$3^{\text{rd}} \text{ Quartile} = 40$$

Q10

$$P(A) = 0.4$$

$$P(B) = p$$

$$P(A \cup B) = 0.6$$

$$P(A \cap B) = P(A) \cdot P(B)$$

$$P(A \cup B) = P(A) + P(B) - P(A) \cdot P(B)$$

$$0.6 = 0.4 + p - 0.4p$$

$$0.6 = 0.4 + 0.6p$$

$$0.2 = 0.6p$$

Ans $\boxed{p = \frac{1}{3}}$

Q11

$$P(B|A) = \frac{P(B \cap A)}{P(A)}$$

$$P(A) = 0.8$$

$$P(B \cap A) = 0.6$$

$$P(B|A) = \frac{0.6}{0.8}$$

$$P(B|A) = \frac{3}{4}$$

Ans $\boxed{P(B|A) = 0.75}$

Q12

Total outcomes:

 $\{(5,1), (5,2), (5,3), (5,4), (5,5), (5,6)\}$

The outcomes with sum 9:

 $\{(5,5), (5,6)\}$

$$\text{Probability} = \frac{2}{6}$$

$$\text{Ans } \boxed{P = 1/3}$$

Q13

No. of outcomes per bin = 10
Since it is a 3-digit no.

$$P = 10 \times 10 \times 10$$

$$\boxed{P = 1000} \text{ Ans}$$

Q14

$$\text{Total outcomes} = 20 + 13 + 6 = 39$$

$$P(\text{Independent}) = \frac{6}{39}$$

$$P(\text{Democrat}) = \frac{13}{39}$$

$$\begin{aligned} P(\text{Independent or Democrat}) &= P(\text{Independent}) + P(\text{Democrat}) \\ &= \frac{6}{39} + \frac{13}{39} \\ &= \frac{19}{39} \end{aligned}$$