

Revision Exercise Solutions.

$$1/ \{ 2, 3, 1, 2, 4, 2, 5 \}$$

Rearrange in order of Size: -

$$\{ 1, 2, 2, 2, 3, 4, 5 \}$$

$$(i) \text{ Mode} = 2$$

$$\begin{aligned} (ii) \bar{x} &= \frac{1}{n} \sum x \\ &= \frac{1}{7} (1+2+2+2+3+4+5) \\ &= \frac{1}{7} (19) \\ &= 2\frac{5}{7} \end{aligned}$$

$$\begin{aligned} (iii) Q_1 &= \frac{1}{4} (n+1)^{\text{th}} \text{ value} \\ &= \frac{1}{4} (7+1)^{\text{th}} \\ &= 2^{\text{nd}} \text{ value} \\ &= 2. \end{aligned}$$

$$\begin{aligned} Q_3 &= \frac{3}{4} (n+1)^{\text{th}} \text{ value} \\ &= \frac{3}{4} \times 8^{\text{th}} \text{ value} \\ &= 6 \text{ value} \\ &= 4 \end{aligned}$$

$$iv) IQR = Q_3 - Q_1 = 4 - 2 = 2$$

$$\begin{aligned}\sigma^2 &= \frac{1}{n} \sum_1^7 x^2 - (\bar{x})^2 \\ &= \frac{1}{7} \sum_1^7 x^2 - (2\frac{5}{7})^2\end{aligned}$$

$$\begin{aligned}\sum_1^7 x^2 &= 1^2 + 2^2 + 2^2 + 2^2 + 3^2 + 4^2 + 5^2 \\ &= 1 + 4 + 4 + 4 + 9 + 16 + 25 \\ &= 63\end{aligned}$$

$$\begin{aligned}\sigma^2 &= \frac{1}{7} (63) - (2\frac{5}{7})^2 \\ &= 9 - (2\frac{5}{7})^2 \\ &= \underline{1\frac{3}{49}}\end{aligned}$$

$$\sigma = \sqrt{1\frac{3}{49}}$$

$$= \underline{1.28 \text{ (2 dpl's)}}.$$

^{2/} x	f	f x	x ²	f x ²
1	6	6	1	6
2	3	6	4	12
3	2	6	9	18
4	4	16	16	64

$$\sum x = 10 \quad \sum f = 15 \quad \sum fx = 34 \quad \sum fx^2 = 100$$

$$\bar{x} = \frac{\sum f x}{\sum f} = \frac{34}{15} = 2.27 \text{ (2dp's)}$$

$$\begin{aligned} \sigma^2 &= \frac{\sum f x^2}{\sum f} - (\bar{x})^2 \\ &= \frac{100}{15} - (2.27)^2 \\ &= 1.51 \text{ (2dp's)} \end{aligned}$$

$$\begin{aligned} \therefore \sigma &= \sqrt{1.51} \\ &= 1.2 \text{ (1dp)} \end{aligned}$$

3

x	y	x^2	y^2	xy
1	4	1	16	4
2	7	4	49	14
3	10	9	100	30
4	13	16	169	52
5	16	25	256	80

$$\sum x = 15 \quad \sum y = 50 \quad \sum x^2 = 55 \quad \sum y^2 = 590 \quad \sum xy = 180$$

$$\bar{x} = \frac{1}{n} \sum x$$

$$\bar{x} = \frac{1}{5} (15)$$

$$\bar{x} = \underline{3}$$

$$\bar{y} = \frac{1}{n} \sum y$$

$$= \frac{1}{5} (50)$$

$$= \underline{10}$$

$$S_{xx} = \frac{1}{n} \sum x^2 - (\bar{x})^2$$

$$= \frac{1}{5} (55) - (3)^2$$

$$= 11 - 9$$

$$= \underline{2}$$

$$\begin{aligned}
 S_{yy} &= \frac{1}{n} \sum y^2 - (\bar{y})^2 \\
 &= \frac{1}{5} (590) - (10)^2 \\
 &= \underline{18}
 \end{aligned}$$

$$\begin{aligned}
 S_{xy} &= \frac{1}{n} \sum xy - (\bar{x})(\bar{y}) \\
 &= \frac{1}{5} (180) - (3)(10) \\
 &= \underline{6}
 \end{aligned}$$

$$\begin{aligned}
 \text{Then: - (i) } R_p &= \frac{S_{xy}}{\sqrt{S_{xx} \cdot S_{yy}}} \\
 &= \frac{6}{\sqrt{2 \times 18}}
 \end{aligned}$$

Perfect +ve = +1
 Correlation between
 x and y variables

$$\text{(ii) } y - \bar{y} = \frac{S_{xy}}{S_{xx}} (x - \bar{x})$$

$$y - 10 = \frac{6}{2} (x - 3)$$

$$y - 10 = 3x - 9$$

$$\underline{y = 3x + 1} \text{ is Required line.}$$

$$\frac{4}{i) S = \{HHH, \underline{HHT}, \underline{HTH}, HTT, TTT, TTH, THT, \underline{THH}\}}$$

$$ii) P(2H, 1T) = \frac{3}{8}$$

$$iii) P(4H) = 0 \quad \text{Impossible.}$$

$$5/ \quad P(A) = 0.6 \quad P(B) = 0.4 \quad P(A \cap B) = 0.3$$

$$\begin{aligned} P(A \cup B) &= P(A) + P(B) - P(A \cap B) \\ &= 0.6 + 0.4 - 0.3 \\ &= 0.7 \end{aligned}$$

$$\begin{aligned} P(A \cap B') &= P(A) - P(A \cap B) \\ &= 0.6 - 0.3 \\ &= 0.3 \end{aligned}$$

$$\begin{aligned} P(A) \times P(B) &= 0.6 \times 0.4 \\ &= 0.24 \\ &\neq P(A \cap B) \end{aligned}$$

$\therefore$ NOT Independent Events.