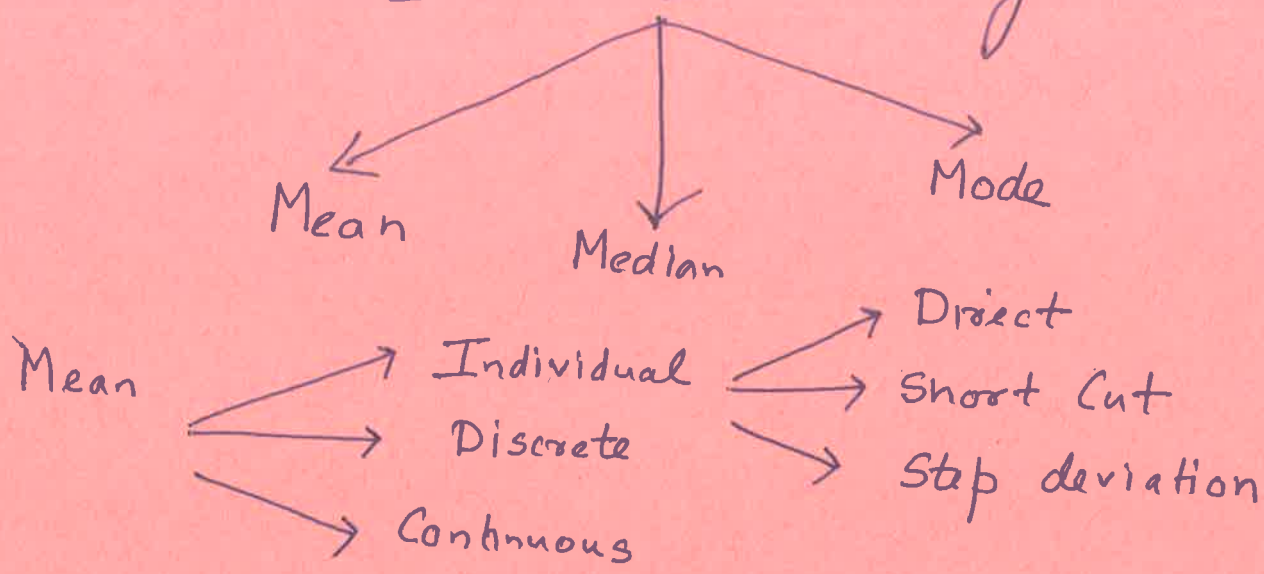


Measures of Central Tendency



Mean - Individual Series

| x | x | $d = (x - A)$ | x | $d = (x - A)$ | $d' = \frac{x - A}{c}$ | $C = 5$ |
|------------------|-----|-----------------|-----|---------------|------------------------|---------|
| 30 | 30 | -10 | 30 | -10 | -2 | |
| 45 | 45 | +5 | 45 | +5 | +1 | |
| 60 | 60 | +20 | 60 | +20 | +4 | |
| 40 | 40 | 0 | 40 | 0 | +0 | |
| 15 | 15 | -25 | 15 | -25 | -5 | |
| 65 | 65 | +25 | 65 | +25 | +5 | |
| 85 | 85 | +45 | 85 | +45 | +9 | |
| 20 | 20 | -20 | 20 | -20 | -4 | |
| $\Sigma x = 360$ | | $\Sigma d = 40$ | | | $\Sigma d' = 8$ | |

Direct

Short Cut

step deviation method

$$\bar{x} = \frac{\sum x}{n} = \frac{360}{8} = 45$$

$$\bar{x} = A + \frac{\sum d}{n} = 40 + \frac{40}{8} = 45$$

$$\bar{x} = A + \frac{\sum d'}{n} \times C = 40 + \frac{8}{8} \times 5 = 45$$

C=1

Discrete Series

| x | f | xf | x | f | $d = (x-A)$ | fd | x | f | $d = \frac{x-A}{C}$ | d' | fd' |
|-----|-----------|------------|-----|-----|-------------|------------|-----|-----|---------------------|------|------------|
| 2 | 10 | 20 | 2 | 10 | -3 | -30 | 2 | 10 | -3 | -3 | -30 |
| 3 | 16 | 48 | 3 | 16 | -2 | -32 | 3 | 16 | -2 | -2 | -32 |
| 4 | 11 | 44 | 4 | 11 | -1 | -11 | 4 | 11 | -1 | -1 | -11 |
| 5 | 8 | 40 | 5 | 8 | 0 | 0 | 5 | 8 | 0 | 0 | 0 |
| 6 | 6 | 36 | 6 | 6 | 1 | 6 | 6 | 6 | 1 | 1 | 6 |
| 7 | 4 | 28 | 7 | 4 | 2 | 8 | 7 | 4 | 2 | 2 | 8 |
| 8 | 3 | 24 | 8 | 3 | 3 | 9 | 8 | 3 | 3 | 3 | 9 |
| 9 | 2 | 18 | 9 | 2 | 4 | 8 | 9 | 2 | 4 | 4 | 8 |
| | <u>60</u> | <u>258</u> | | | | <u>-42</u> | | | | | <u>-42</u> |

Q) If Mean = 29
Find f

| x | f | xf |
|----|-----------------|---------------------------------|
| 5 | 5 | 25 |
| 15 | 7 | 105 |
| 25 | f | 25f |
| 35 | 18 | 630 |
| 45 | 5 | 225 |
| 55 | 3 | 165 |
| | $\frac{38+f}{}$ | $\frac{\sum xf = 1150 + 25f}{}$ |

$$\bar{x} = \frac{\sum xf}{\sum f}$$

$$\bar{x} = \frac{1150 + 25f}{38 + f}$$

$$29 = \frac{1150 + 25f}{38 + f}$$

f = 12

Direct Method

(3)

$$\begin{aligned}\bar{x} &= \frac{\sum fx}{\sum f} \\ &= \frac{258}{60} \\ &= 4.30\end{aligned}$$

Short Cut Method

$$\begin{aligned}\bar{x} &= A + \frac{\sum fd}{\sum f} \\ &= 5 + \frac{(-42)}{60} \\ &= 4.30\end{aligned}$$

Step deviation method

$$\begin{aligned}\bar{x} &= A + \frac{\sum fd'}{\sum f} \times C \\ &= 5 + \frac{(-42)}{60} \times 1 \\ &= 4.30\end{aligned}$$

Q) Find f $\bar{x} = 17$

(5)

| C.I | f | x | fx | |
|-------|--------------------------|------|-------------|---------|
| 0-5 | 10 | 2.5 | 25 | → Given |
| 5-10 | 12 | 7.5 | 90 | |
| 10-15 | 16 | 12.5 | 200 | |
| 15-20 | f | 17.5 | $17.5f$ | |
| 20-25 | 14 | 22.5 | 315 | |
| 25-30 | 10 | 27.5 | 275 | |
| 30-35 | 8 | 32.5 | 260 | |
| | <u>$70+f$</u> | | <u>1165</u> | |

$$\bar{x} = \frac{\sum xf}{\sum f}$$

$$17 = \frac{1165 + 17.5f}{70 + f}$$

$$f = 50$$

Wrong Mean to Corrected Mean

(6)

Q) The mean salary paid to 1000 employees of a factory was found to be Rs 180.4. Later on it was discovered that wages of 2 employees were wrongly taken as 297 and 165 instead of 197 and 185. Find Correct mean.

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

$$\bar{x} = 180.4$$

$$n = 1000$$

$$\bar{x} = \frac{\sum x}{1000}$$

$$180.4 = \frac{\sum x}{1000}$$

$$\boxed{180400 = \sum x}$$

Wrong Value = 297
165

Correct Value = 197
185

Correct $\sum x$

$$= W \sum x + C.V - W.V$$

$$= 180400 + 197 + 185 - 297 - 165$$

$$= 180320$$

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

$$= \frac{180320}{1000}$$

$$= 180.32$$

$$= \boxed{180.32}$$

Property

$$\sum (x - \bar{x}) = 0$$

or

The sum of deviation from mean = 0

Ans $\sum (x - \bar{x}) = 0$

$$= \sum x - \sum \bar{x}$$

$$= \sum x - [\bar{x} + \bar{x} + \bar{x} \dots]$$

$$= \sum x - n\bar{x}$$

$$= \cancel{n\bar{x}} - \cancel{n\bar{x}}$$

$$= 0$$

Note

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

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

Combined Mean

8

$$\overline{x} = \frac{n_1 \overline{x}_1 + n_2 \overline{x}_2}{n_1 + n_2}$$

Class 10^m

Section A

Section B

$$\overline{x}_1 = 12$$

$$\overline{x}_2 = 20$$

$$n_1 = 80$$

$$n_2 = 60$$

$$\overline{x} = \frac{n_1 \overline{x}_1 + n_2 \overline{x}_2}{n_1 + n_2}$$

$$= \frac{(80 \times 12) + (60 \times 20)}{80 + 60}$$

$$= \frac{960 + 1200}{140}$$

$$= 15.43$$