Central Tendency

Mean → Mode → Medium.

① Mean :-

$\bar{x} = \frac{\Sigma x}{N}$ (Discreat)

$\bar{x} = \frac{\Sigma Fx}{N}$ (F.D)

$\bar{x} = \frac{\Sigma Fxm}{N}$ (Grouped)

Assumed Mean :-

$\bar{x} = A + \frac{\Sigma fd}{N} \times C$

Combined Mean :-

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

② Median

$Me = l_1 + \left(\frac{\frac{N}{2} - N_1}{N_4 - N_1}\right) \times C$

$\Sigma |x - Me|$ is minimam

If n = even → mean Middle

If n = odd – avg. of Middle.

③ Mode :-

$Mo = l_1 + \left(\frac{f_0 - f_{-1}}{2f_0 - f_{-1} - f_1}\right) \times C$

Relation b/w Mean, Median, Mode :-

Mean – Mode = 3 (Mean – Medium)

Mean – Mode = 3 Mean – 3 Medium

Mode = Mean – 3 Means + 3 Medium

Mode = 3 Median – 2 Mean.

Partition Values :-

:→ Rank Calculation $(n+1)^{Pth}$ term : - Value of P depends on P.V.

Name	No. of equal parts	No. of partition	Symbols
Medium	2	1	Me
Quartile	4	3	$Q_1\ Q_2\ Q_3$...
Decile	10	9	$D_1\ D_2\ D_3$ ...
Percentile	100	99	$P_1\ P_2\ P_3$ ....

	Median	Quartile (Quadrium)	Decile	percentile
1st	1/2	1/4	1/10	1/100
2nd		2/4	2/10	2/100
Last		3/4	9/10	99/100

Geometric Mean :-

→ In Discreat

$G_1 = (x_1 \times x_2 \times x_n)^{1/n}$

→ In Grouped :-

$G_1 = (x_1^{f_1} \times x_2^{f_2} \times x_n^{fn})^{1/n}$

Harmonic Mean :-

Reciprocal of AM of observation.

In Discreat

$H = \frac{n}{\Sigma\left(\frac{1}{x}\right)}$

In Grouped.

$H = \frac{n}{\Sigma\left(\frac{f}{x}\right)}$

Combined HM

$HM = \frac{n_1 + n_2}{\frac{n_1}{H_1} + \frac{n_2}{H_2}}$

Special Relation

$AM \times HM = (GM)^2$

Range :-

L – S

Coefficient of Rank.

$\frac{L - S}{L + S} \times 100$

Mean Deviation

In Discreat :-

$M_{D_A} = \frac{1}{n}\Sigma|x - A|$

In Grouped.

$M_{D_n} = \frac{1}{n}\Sigma F|x - A|$

Coefficient of Mean Deviation

$CO_{MD} = \frac{M_D \text{ about } A}{A(\text{Median})} \times 100$

Standard Deviation

In Discreat :-

$\sigma_x = SD_x = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n}}$

$\sigma_x = SD_x = \frac{\Sigma x^2}{n} - (\bar{x})^2$

In Grouped –

$\sigma_x = SD_x = \frac{\sqrt{\Sigma f(x - \bar{x})}}{n}$

$= \sqrt{\frac{\Sigma fx^2}{N} - (\bar{x})^2}$

Quartile Deviations :-

$Q_{Dx} = \frac{Q_3 - Q_1}{2}$.

Coefficient of QD

$\frac{Q_3 - Q_1}{Q_3 + Q_1} \times 100$

Same as in Central tendency

Relation b/w SD, MD, QD.

4 SD = 5 MD = 6 QD

or

SD : MD : QD = 15 : 12 : 10

Coefficient of Variance :-

$\frac{SD_x}{\bar{x}} \times 100$

SD of any two no :- Range.

SD of 1st N natural no. → $S = \sqrt{\frac{n^2 - 1}{12}}$