Statistics

Mean

(i) $\bar{x} = \frac{\sum x_i}{N}$ (ii) $\bar{x} = \frac{\sum f_i x_i}{N}$, where $N = \sum f$

Combined Mean

$$\text{Combined Mean} = \frac{n_1\bar{x}_1 + n_2\bar{x}_2 + n_3\bar{x}_3}{n_1+n_2+n_3}$$

**NOTE :- If you are changing each and every observation by either $\times, -, +, \div$ then there will be a same change in the mean also.

Median

(1) For even observations → median is $\left(\frac{n}{2}\right)^{th}$ and $\left(\frac{n}{2}+1\right)^{th}$ term.

For odd observation → median is $\left(\frac{n+1}{2}\right)^{th}$ term.

(2) for table related data →

$$\text{Median} = l + \left(\frac{\frac{N}{2} - C.F}{f}\right) \times h$$

$l \rightarrow$

$N \rightarrow$

$C.f \rightarrow$

$f \rightarrow$

$h \rightarrow$

Mode

$$\text{Mode} = l + \frac{f_1 - f_0}{2f_1 - f_2 - f_0} \times h,$$ where, $l \rightarrow$ lower limit of the mode class

$f_1 \rightarrow$ max frequency

$f_0 \rightarrow$ frequency just before f_0

$f_2 \rightarrow$ frequency just after f_0

$h \rightarrow$ Range of the class

Measures of Dispersions

Observation : x_i Deviations (d_i) : $x_i - A$, A is any no.

Mean Deviation

$$M.D = \frac{|d_i|}{n} \quad \text{or,} \quad M.D = \frac{\sum f_i d_i}{\sum f_i}$$

** NOTE :- Mean deviation is minimum about Median.

Standard Deviation and Variance

$\left.\begin{matrix}\text{Standard Deviation} \\ \text{and Variance}\end{matrix}\right\} \rightarrow$ always taken from mean

$$\underset{(\sigma)}{S.D} = \sqrt{\text{variane}}$$

variance = Mean of $(d_i)^2$

or, $V =$ Mean of $(x_i)^2 - (\bar{x})^2$

Results

(i) If observations are increased or decreased by 'a' then, their is no changes in σ and V.

(ii) If 'a' is multiplied or divide with each and every observations then, S.D gets multiplied or divided by 'a' and variance by 'a^2'.

** (iii) Variance for 'n' successive natural no. →

$$V = \left(\frac{n^2-1}{12}\right)$$

(iv) Variance of n consecutive even or odd natural no. →

$$V = \left(\frac{n^2-1}{12}\right) \times 4 = \left(\frac{n^2-1}{3}\right)$$

(v) $C.V = \frac{\sigma}{\bar{x}} \times 100$ → Coefficient of variation.

Combined Data

$$\boxed{\text{Combined } S.D(\sigma) = \sqrt{\frac{n_1(\sigma_1^2 + d_1^2) + n_2(\sigma_2^2 + d_2^2)}{n_1 + n_2}}}$$