Mean

Individual Series

Direct Method: $\bar{X} = \frac{\Sigma X}{N}$

Assumed Mean Method = $\bar{X} = A + \frac{\Sigma d}{N}$ Here $d = X - A$

Step deviation Method :

$$\bar{X} = A + \frac{\Sigma d'}{N} \times C$$

$\left[\text{midvalue} = \frac{L_1 + L_2}{2} \right]$

Discreate Series:

Direct Method: $\bar{X} = \frac{\Sigma fX}{\Sigma F}$

Assumed Mean

$$\bar{X} = A + \frac{\Sigma fd}{\Sigma f}$$

Step Deviation Method:

$$\bar{X} = A + \frac{\Sigma fd'}{\Sigma f} \times C$$

Frequency Disribution

Direct: $\bar{X} = \frac{\Sigma fm}{\Sigma f}$

Assumed: $\bar{X} = A + \frac{\Sigma fd}{\Sigma f}$

Step deviation:

$\bar{X} = A + \frac{\Sigma fd'}{\Sigma f} \times C$ Here, C = Common factor

$d' = \frac{d}{C}$

Calculated of correct mean

$$\bar{X} = \frac{\Sigma X(\text{wrong}) + (\text{correct value}) - (\text{incorrect value})}{N}$$

Calculation of Weighted Mean

$$\bar{X}_W = \frac{\Sigma WX}{\Sigma W}$$

Combined Mean

$$X_{1,2} = \frac{\bar{X}_1 N_1 + \bar{X}_2 N_2}{N_1 + N_2}$$

Correlation:

Karl Pearson Coefficient of correlation

Direct Method: $r = \frac{\Sigma xy}{\sqrt{\Sigma x^2} \times \sqrt{\Sigma y^2}}$ $\quad x = X - \bar{X}$ $\quad y = Y - \bar{Y}$

$\bar{X} = \frac{\Sigma X}{N}$ $\quad \bar{Y} = \frac{\Sigma Y}{N}$

Shortcut Method:

$$r = \frac{\Sigma dxdy - \frac{\Sigma dx \times \Sigma dy}{N}}{\sqrt{\Sigma dx^2 - \frac{(\Sigma dx)^2}{N}} \times \sqrt{\Sigma dy^2 - \frac{(\Sigma dy)^2}{N}}}$$

Here, $dx = X - A$

$dy = Y - A$ $\quad A$ = Assumed Mean

Step deviation Method:

$$r = \frac{\Sigma dx'dy' - \frac{\Sigma dx' \times \Sigma dy'}{N}}{\sqrt{\Sigma dx'^2 - \frac{(\Sigma dx')^2}{N}} \times \sqrt{\Sigma dy'^2 - \frac{(\Sigma dy')^2}{N}}}$$

$dx = X - A$

$dy = Y - A$

$dx' = \frac{dx}{c}$

$dy' = \frac{dy}{c}$

Spearesman Rank Correlation

(Rank not repeated)

$D = R_1 - R_2$ $\quad rk = 1 - \frac{6\Sigma D^2}{N^3 - N}$

(When rank is repeated)

$$rk = 1 - \frac{6\left[\Sigma D^2 + \frac{1}{12}(m_1^2 - m_1) + \frac{1}{12}(m_2^2 - m_2) ----\right]}{N^3 - N}$$

Median:

Individual Series

$M = \frac{N+1}{2}$ th term

Discreate Series

Median $= \frac{N+1}{2}$ th term

Continuous series

$$M = L_1 + \frac{\frac{N}{2} - cf}{f} \times i$$

Mode:

In continious series:

$$Z = L_1 + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times i$$

Calculation of Mode with Arithmetic Mean

$Z = 3M - 2\bar{X}$

Here, Z = Mode, M = Median, $\bar{X}$ = Mean

Index Numbers

Simple Aggregative Method:

$$P_{01} = \frac{\Sigma P_1}{\Sigma P_0} \times 100$$

Weighted Average of Price Relatives Method:

$$P_{01} = \frac{\Sigma RW}{\Sigma W} \quad \text{Here } R = \frac{P_1}{P_0} \times 100$$

Weighted Aggregative Method:

(i) Laspeyre's Method: $P_{01} = \frac{\Sigma P_1 q_0}{\Sigma P_0 q_0} \times 100$

(ii) Paasche's Method:

$$P_{01} = \frac{\Sigma P_1 q_1}{\Sigma P_0 q_1} \times 100$$

(iii) Fisher's Method:

$$P_{01} = \sqrt{\frac{\Sigma P_1 q_0}{\Sigma P_0 q_0} \times \frac{\Sigma P_1 q_1}{\Sigma P_0 q_1}} \times 100$$

Consumer Price Index (CPI)

$$CPI = \frac{\Sigma P_1 q_0}{\Sigma P_0 q_0} \times 100 \quad \text{(Aggregative Expenditure Method)}$$

(Family Budget Method)

$$CPI = \frac{\Sigma RW}{\Sigma W} \quad \text{Here, } W = P_0 q_0, \quad R = \frac{P_1}{P_0} \times 100$$

↳ R = Current year's price relative of various items

W = Weight of various items.

Simple Average of Price Relative Method

$$P_{01} = \frac{\Sigma \left(\frac{P_1}{P_0} \times 100 \right)}{N}$$

N = no. of goods.