

Measures of Central Tendency – Mean

The numerical expressions which represent the characteristics of a group are called Measures of Central Tendency.

Three measures of central tendency are:

- i. Mean
- ii. Median
- iii. Mode

Arithmetic Mean

The arithmetic mean “is the sum of all observations in the data divided by the number of observations.”

$$\text{Arithmetic Mean of } n \text{ numbers } x_1, x_2, x_3, \dots, x_n = \frac{x_1 + x_2 + x_3 + \dots + x_n}{n} = \frac{\sum x}{n}$$

The greek letter Σ (called sigma) represents the sum of numbers.

Arithmetic mean may be computed by anyone of the following methods:

- i. Direct method
- ii. Short-cut method
- iii. Step-deviation method

Direct method

If a variable X takes values $x_1, x_2, x_3, \dots, x_n$ with corresponding frequencies $f_1, f_2, f_3, \dots, f_n$ respectively, then arithmetic mean of these values is given by,

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

Short-cut method

This method is used to overcome the difficulty faced in calculations where big quantities are involved.

Let $x_1, x_2, \dots, x_n$ be value at a variable x with corresponding frequencies $f_1, f_2, \dots, f_n$ respectively.

Taking derivative about an arbitrary point 'A', we have

$$\text{Mean} = A + \frac{\sum fd}{\sum f}, \text{ where } A = \text{Assumed mean and } d = x - A$$

Step-deviation method

Sometimes during the application of the short-cut method for finding arithmetic mean of derivative d is divisible by common number i (say). In such cases arithmetic is reduced to a great extent by taking $u_i =$

$$t = \frac{d}{i} = \frac{x - A}{i}, \text{ then}$$

$$\text{Mean} = A + \frac{\sum ft}{\sum f} \times i$$