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."

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

The greek letter $\sum$ (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 $x_1, x_2, x_3 \ldots., x_n$ with corresponding frequencies $f_1, f_2, f_3, \ldots f_n$ 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 $x_1, x_2, \ldots\ldots., x_n$ be value at a variable x with corresponding frequencies $f_1, f_2, \ldots\ldots., f_n$ respectively.

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

$\text{Mean} = A + \frac{\sum fd}{\sum f}$, where A = 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= $t = \frac{d}{i} = \frac{x - A}{i}$, then

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