

Arithmetic mean

It is the central tendency obtained by dividing the total number of the items to the sum of the value of all items or variables. It is denoted by \bar{X} .

Arithmetic Mean or Mean = $\frac{\text{sum of the value of all items}}{\text{number of items}}$

It is also written as

$$\bar{X} = \frac{x_1 + x_2 + x_3 + x_4 + \dots + x_n}{N(=\text{number of items})} = \frac{\sum X}{N}$$

Calculation

1) For individual observation (Raw data) — here frequencies are not given.

$$\bar{X} = \frac{\sum X}{N}$$

2) For discrete series — here frequencies of the variables are given but variable are without class interval.

a) Direct method

In this method the values of the variable are multiplied by their respective frequencies and the products thus obtained are totaled. This total is then divided with total number of items.

$$\bar{X} = \frac{f_1x_1 + f_2x_2 + f_3x_3 + f_4x_4 + \dots + f_nx_n}{N(=\text{number of items})} = \frac{\sum fX}{N}$$

Here-

f = frequency

N = $\sum f$ = total number of items

3) For continuous series

a) Direct Method –

Process of calculation

Steps –

Mid value (Mid X or 'm') of each class is found out

Mid X is multiply with frequency 'f' of each class i.e. fMid X

All the products of mid X and frequency of each class are added thus

$\Sigma f \text{mid}X$ is calculated

$\Sigma f \text{mid}X$ is divided with total number of items 'N'

Formula-

$$\bar{X} = \frac{\Sigma f \text{mid}X}{N} = \frac{\Sigma f \text{mid}X}{\Sigma f}$$

b) Step deviation method

Formula

$$\bar{X} = A + \left(\frac{\Sigma fd}{N} \right) * C$$

Where,

$$d = \frac{m-A}{C}$$

A = Assumed mean

C = Class interval

f = Frequency

$$N = \Sigma f$$

m = mid value or mid X

Process of calculation-

- Mid value for each class is calculated
- Any one value of mid value is assumed as assumed mean 'A';

- Deviation for each class is calculated
- Deviation 'D' = m-A
- Deviation 'D' is divided with class interval 'C', $d = \frac{D}{c} = \frac{m-A}{C}$
- To calculate Mean formula is used.

Merit

- It is based on circulation
- Not based on assumption.
- It is based on all of the items.
- It is easy for further calculation
- Its value is depends on every item of series.
- Sampling fluctuation do not affect the value of mean

Demerit

- Result is greatly affect by extreme values.
- Sometime absurd result is found. e.g. average 2.5 children/family.
- Need more calculation than Mode and Median
- It is upward biased

Thus A. M has great importance

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Assignment

Find mean

Length of fishes cm)	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Number of fishes	10	18	20	26	30	28	18

Ans- 48.6