Study Materials

Class - B. Com Hons Sem IV
Sub Code – BCH 4.2
Topic – Mathematical Averages – Mean

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Average and Types of Averages

" A single value which can represent a whole set of data is called an average." If the average tends to lie and indicate the center of the distribution it is called a measure of central tendency or sometimes they locate the general position of data so they are also called the measures of locations.
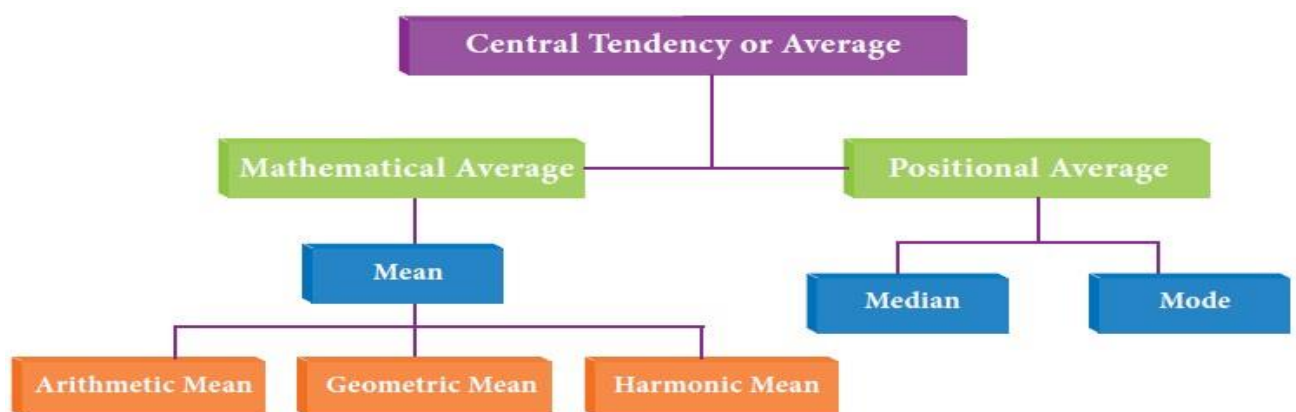
Arithmetic Mean

(a) To find A.M. for Raw data

For a raw data, the arithmetic mean of a series of numbers is sum of all observations divided by the number of observations in the series. Thus if x_1, x_2, ..., x_n represent the values of n observations, then arithmetic mean (A.M.) for n observations is: (direct method)

$$\overline{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$$

There are two methods for computing the A.M :

(i) Direct method

(ii) Short cut method.

Example .1

The following data represent the number of books issued in a school library on selected from 7 different days 7, 9, 12, 15, 5, 4, 11 find the mean number of books.

Solution:

$$\overline{x} = \frac{1}{n} \sum_{i-1}^{n} x_i$$

$$\overline{x} = \frac{7 + 9 + 12 + 15 + 5 + 4 + 11}{7}$$

$$= \frac{63}{7} = 9$$

Hence the mean of the number of books is 9

Short-cut Method to find A.M.

Under this method an assumed mean or an arbitrary value (denoted by A) is used as the basis of calculation of deviations (d_i) from individual values. That is if $d_i = x_i - A$

Then

$$\bar{x} = A + \frac{\sum\limits_{i=1}^{n} d_i}{n}$$

Example .2

A student's marks in 5 subjects are 75, 68, 80, 92, 56. Find the average of his marks.

Solution:

Let us take the assumed mean, A = 68

x_i	$d_i = x_i - 68$
75	7
68	0
80	12
56	-12
92	24
Total	31

$$\begin{aligned}
\bar{x} &= A + \frac{\sum\limits_{i=1}^{n} d_i}{n} \\
&= 68 + \frac{31}{5} \\
&= 68 + 6.2 = 74.2
\end{aligned}$$

The arithmetic mean of average marks is 74.2

(b) To find A.M. for Discrete Grouped data

If $x_1, x_2, ..., x_n$ are discrete values with the corresponding frequencies $f_1, f_2, ..., f_n$. Then the mean for discrete grouped data is defined as (direct method)

$$\overline{x} = \frac{\sum\limits_{i=1}^{n} f_i x_i}{N}$$

In the short cut method the formula is modified as

$$\overline{x} = A + \frac{\sum\limits_{i=1}^{n} f_i d_i}{N} \quad \text{where} \quad d_i = x_i - A$$

Example 5.3

A proof reads through 73 pages manuscript The number of mistakes found on each of the pages are summarized in the table below Determine the mean number of mistakes found per page

No of mistakes	1	2	3	4	5	6	7
No of pages	5	9	12	17	14	10	6

Solution:

(i) Direct Method

x_i	f_i	$f_i x_i$
1	5	5
2	9	18
3	12	36
4	17	68
5	14	70
6	10	60
7	6	42
Total	N=73	299

$$\overline{x} = \frac{\sum\limits_{i=1}^{n} f_i x_i}{N}$$

$$= \frac{299}{73}$$

$$= 4.09$$

The mean number of mistakes is 4.09

(ii) Short-cut Method

x_i	f_i	$d_i = x_i - A$	$f_i d_i$
1	5	-3	-15
2	9	-2	-18
3	12	-1	-12
4	17	0	0
5	14	1	14
6	10	2	20
7	6	3	18
	$\Sigma f_i = 73$		$\Sigma f_i d_i = 7$

$$\bar{x} = A + \frac{\sum_{i=1}^{n} f_i d_i}{N}$$

$$= 4 + \frac{7}{73}$$

$$= 4.09$$

The mean number of mistakes = 4.09