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Measurement of Central Tendency

Central tendency of a distribution is a value around which data in the distribution tend to cluster. Measures of central tendency are used to define average and center of a distribution. Mean is average of a distribution of data series. Median is midpoint of any distribution. Mode is most frequently occurring item in any distribution. Generally central tendency measures average of data series. Measures of average (central tendency) is of two types—

1. **Mathematical Average-** It measures mean of a distribution. Mathematical average is of three types-
   - **I.** Arithmetic Mean
   - **II.** Geometric Mean
   - **III.** Harmonic Mean
2. **Positional Average-** It shows position. Further it is two types--
   - **I.** Median
   - **II.** Mode

I. Arithmetic Mean- In short, it is known as mean. It measures average of a distribution. Three methods are available to calculate mean.

- **a.** Direct Method
- **b.** Deviation/Assume Mean Method
- **c.** Step-Deviation Method

a. Direct Method

- **For Individual Data Series**

X
3
2
1
5
4
$\sum X$ =15

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

$$Mean = \frac{15}{5} = 3$$

Mean of this individual series is **3**.

- **For Discrete Data Series**

Variable (X)	*Frequency (f)*	*f. X*
3	4	12
2	1	02
5	3	15
7	2	14
	$\sum f$= 10	$\sum f.X$ =43

$$Mean = \frac{\sum f.X}{\sum f}$$

$$Mean = \frac{43}{10} = 4.3 \text{ Ans.}$$

- **For Continuous Data Series**

Class Interval	*Mid-Point (X)*	*Frequency (f)*	*f. X*
0-10	5	3	15
10-20	15	1	15
20-30	25	2	50
30-40	35	4	140
		$\sum f$= 10	$\sum f.X$ =220

$$Mid\ Point = \frac{Upper\ Limit - Lower\ Limit}{2}$$

$$Mean = \frac{\sum f.X}{\sum f}$$

$$Mean = \frac{220}{10} = 22 \text{ Ans.}$$

B. Assume Mean Method

Note: Deviation- Method in which any particular number is subtracted from all the data of the

Series, is known is deviation.

- **Individual Series**

Suppose assumed mean (A) is **1.**

X	**d =X-A**
3	2
2	1
1	0
5	4
4	3
	$\sum \boldsymbol{d}$ =10

$$\boldsymbol{Mean = A + \frac{\sum . d}{N}}$$

$$\boldsymbol{Mean = 3 + \frac{10}{5} = 3 + 2 = 5} \ \textit{Ans.}$$

Mean for individual series with the help of deviation method is **5**.

- **For Discrete Data Series**
  Suppose assumed mean (A) is **2**

Variable (X)	***Frequency (f)***	***d =X-A***	***f. d***
3	4	1	4
2	1	0	0
5	3	3	9
7	2	5	10
	$\sum \boldsymbol{f}$**= 10**		$\sum \boldsymbol{f.d}$ **=23**

$$\boldsymbol{Mean = A + \frac{\sum f.d}{\sum f}}$$

$$\boldsymbol{Mean = 2 + \frac{23}{10} = 2 + 2.3 = 4.3} \ \textit{Ans.}$$

- **For Continuous Data Series**

Suppose assume mean (A) is **15**

Class Interval	***Mid- Point (X)***	***Frequency (f)***	***d =X-A***	***f. d***
0-10	5	3	-10	-30
10-20	15	1	00	00
20-30	25	2	10	20
30-40	35	4	20	80
		$\sum f$= **10**		$\sum f.d$ =**70**

$$Mean = A + \frac{\sum f.d}{\sum f}$$

$$Mean = 15 + \frac{70}{10} = 15 + 07 = 22 \text{ Ans.}$$

C. Step-Deviation Method

It is generally applied on continuous data series.

Suppose assumed mean (A) is **15** and step number (h) is **5**.

Class Interval	***Mid-Point (X)***	***Frequency (f)***	***d =X-A***	***K = d/h***	***f. K***
0-10	5	3	-10	-2	-6
10-20	15	1	00	0	0
20-30	25	2	10	2	4
30-40	35	4	20	4	16
		$\sum f$= **10**			$\sum f.k$ =**14**

$$Mean = A + h.\frac{\sum f.K}{\sum f}$$

$$Mean = 15 + 5.\frac{14}{10} = 15 + 7 = 22 \text{ Ans.}$$