Mode

Definition: Mode is the value of the variable which is predominant in the series.

1. For a discrete frequency distribution , mode is the value of *x –corresponding to maximum frequency.*

x	1	2	3	4	5	6	7	8
f	4	9	16	25	22	15	7	3

2. For Continuous Frequency distribution:

$$\text{Mode} = l + \frac{h(f_1 - f_0)}{(f_1 - f_0) - (f_2 - f_1)} = l + \frac{h(f_1 - f_0)}{2f_1 - f_0 - f_2}$$

l–lower limit of the modal class, h –magnitude of the modal class
f_1 -frequency of the modal class
f_0 *and* f_2 -frequencies of the class preceding and succeeding the modal class

Example: Find mode

C.I.	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	8	7	12	28	20	10	10

Hence the maximum frequency is 28.

Thus the modal class is 40-50.

$$\text{Mode} = 40 + 10\frac{(28-12)}{2*28-12-20} = 46.67$$

A distribution is having only one mode is called ***Unimodal***.
If it contains more than one mode, it is called ***bimodal*** or ***multimodal***.

Note: In the following three cases, mode can not be obtained by using the above formula:
(a)When the highest frequency is observed at the beginning of the frequency table.
(b)When the highest frequency is observed at the ending of the frequency table.
(c)When two or more class intervals contain the same maximum frequencies.

However, in the above three cases, mode can be obtained by using either a method called 'Grouping method' or 'empirical relationship between arithmetic mean, median and mode.

The empirical relationship between mean, median and mode is

$$\text{Mean} - \text{Mode} = 3\,(\text{Mean} - \text{Median})$$

Or, $$\text{Mode} = 3\,\text{Median} - 2\,\text{Mean}.$$

Calculate the mean, median and mode for the following data.

Wages (in lakhs.)	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
No. of workers	31	47	59	78	104	113	81	60	52	25

Mean =39.52

Median=39.77

Mode=40.6

Calculate the Mean, Median and Mode for the following data.

Variable	10-13	13-16	16-19	19-22	22-25	25-28	28-31	31-34	34-37	37-40
Frequency	8	15	27	51	75	54	36	18	9	7

Mean=24.19

Median=23.96

Mode=23.6

Uses of Mode :Mode finds an important place in marketing studies, where a manager of a business concern is interested in knowing about the size which has the highest concentration of items. For example, in placing an order for shoes or ready made garments, the model size helps because this size and other sizes around it are in common demand. It is also used in dealing with non-quantitative data

Series A	*Series B*	*Series C*
200 200 200 200 200	200 205 202 203 190	1 989 2 3 5
Mean = 200	200	200

Measure of Dispersion

- *Scatteredness* (*homogeneity or heterogeneity*)

The degree to which numerical data tend to spread about an average value is called variation or dispersion of data.

Measures of Dispersion: Range

Quartile Deviation

Mean Deviation

Standard Deviation

Range

Definition: Difference between the value of the smallest item and the value of the largest item in the distribution.

$$\textbf{Range} = L - S$$

L – Largest Value, S- Smallest Value

The *relative measure* corresponding to range is called the ***coefficient of range***,

$$\textbf{Coefficient of Range} = \frac{L-S}{L+S}$$

Example 1: The following are the prices of shares of a company from Monday to Saturday:

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Price(Rs.)	200	210	208	160	220	250

Calculate the range and its coefficient.

Solution: Range = $L - S$ = 250 – 160 = 90

Range = Rs. 90

$$\text{Coefficient of Range} = \frac{L-S}{L+S} = \frac{250-160}{250+160} = \frac{90}{410} = 0.22$$

In a frequency distribution, range is calculated by taking the difference between the lower limit of the lowest class and the upper limit of the highest class.

Example 2:

Marks	10-20	20-30	30-40	40-50	50-60	60-70
No. of Students	12	18	27	20	17	6

$$\text{Range} = L - S = 70 - 10 = 60$$

$$\text{Coefficient of Range} = \frac{L-S}{L+S} = \frac{70-10}{70+10} = \frac{60}{80} = 0.75$$