



SKEWNESS

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- Skewness is a measure of departure of symmetry, or more precisely, the lack of symmetry. A distribution, or data set, is symmetric if it looks the same to the left and right of the center point.

MEASURES OF SKEWNESS

1) Pearson's first Coefficient of Skewness = $C.S.K = \frac{\text{MEAN} - \text{MODE}}{S.D}$

2) Pearson's Second Coefficient of Skewness = $C.S.K = \frac{3(\text{MEAN} - \text{MEDIAN})}{S.D}$

3) Bowley's Quartile Coefficient of Skewness = $C.S.K = \frac{Q_3 + Q_1 - 2Q_2}{Q_3 - Q_1}$

Characteristics of a symmetrical distribution

The mean, median and mode are same.

The upper and lower quartile are equidistance from median.

$$\text{i.e. } Q_3 - \text{median} = \text{median} - Q_1$$

The sum of deviations from median of any series is zero.

$$\text{i.e. } x - \text{median} = 0$$

Positively skewed distribution

Mean > median > mode .

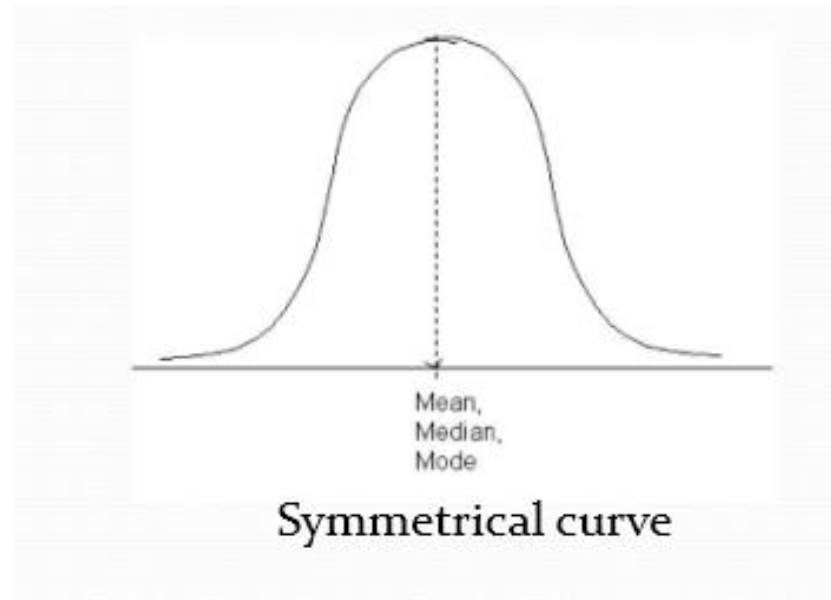
The upper and lower quartile are equidistance from median.

$$\text{i.e. } Q_3 - \text{median} > \text{median} - Q_1$$

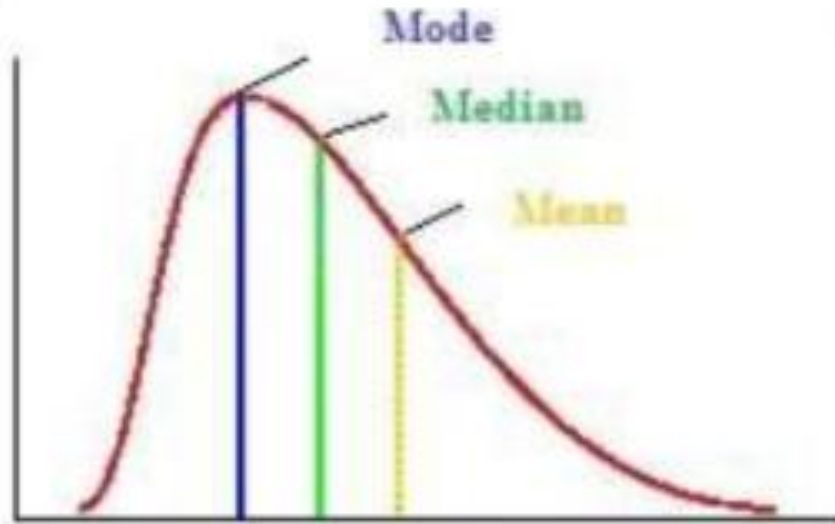
The sum of deviations from median of any series is greater than zero.

$$\text{i.e. } \sum (x - \text{median}) > 0$$

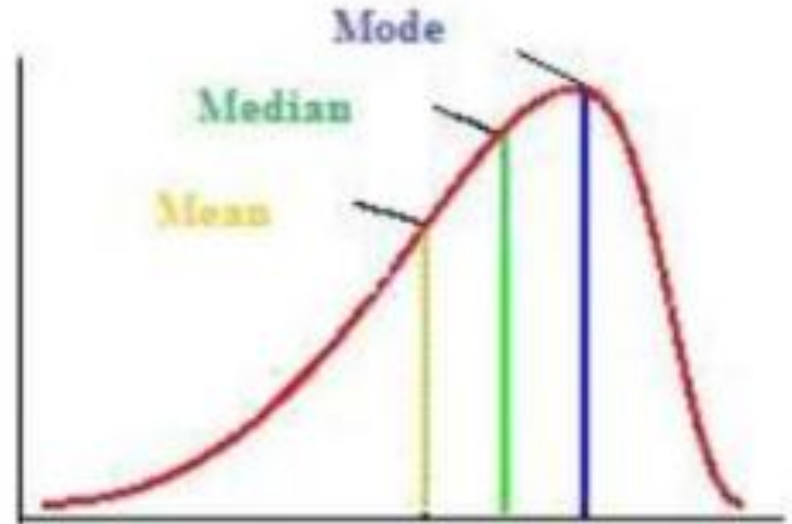
No Skewness



Skewness



Right-Skewed (Positive Skewness)



Left-Skewed (Negative Skewness)

Interpretation

- If $S_k(P) = 0$, then it shows that the distribution is symmetrical (non-skewed)
- If $S_k(P) > 0$, then it shows that the distribution is positively skewed (right -skewed)
- If $S_k(P) < 0$, then it shows that the distribution is negatively (left-skewed)

Practice Questions

1. Calculate Karl Pearson's coefficient of skewness from the data given below and interpret:

X	5	10	15	20	30
F	1	2	7	3	2

Ans: 0.26, Positively skewed

Practice Questions

2. Calculate Bowley's coefficient of skewness from the data given below:

X	5	10	15	20	30
F	1	2	7	3	2

Ans: 1, Positively skewed

Practice Questions

3. Calculate Karl Pearson's coefficient of skewness from the data given below:

X	0-10	10-20	20-30	30-40	40-50	50-60
F	13	15	18	23	19	12

Ans: -0.32, negatively skewed

Practice Questions

4. Calculate Karl Pearson's coefficient of skewness from the data given below:

X	0-7	0-14	0-21	0-28	0-35	0-42	0-49	0-56
F	26	57	92	134	216	287	341	350

Ans: -0.31, negatively skewed

Practice Questions

5. In a moderately skewed frequency distribution the mean is Rs. 10 and its median is Rs. 8.50, if the coefficient of variation is 20%, find the Pearson's coefficient of skewness of the distribution.
Ans: 2.25
6. In a frequency distribution Pearson's coefficient of skewness revealed that this distribution was skewed to the left to an extent of 0.8. Its mean value was less than modal value by 4.8. What was its standard deviation.
Ans : 6

Practice Questions

7. From the following grouped frequency distribution compute the coefficient of Karl Pearson's skewness.

Mid value of income	150	250	350	450	550	650	750	850
NO. of workers	80	105	120	165	100	90	60	40

Ans: 0.08, Positively skewed

Practice Questions

8. Calculate Bowley's coefficient of skewness from the data given below:

X	0-10	10-20	20-30	30-40	40-50	50-60
F	13	15	18	23	19	12

Practice Questions

9. Calculate Bowley's coefficient of skewness from the data given below:

X	0-7	0-14	0-21	0-28	0-35	0-42	0-49	0-56
F	26	57	92	134	216	287	341	350

negatively skewed

Practice Questions

10. From the following grouped frequency distribution compute the coefficient of Bowley's skewness.

Mid value of income	150	250	350	450	550	650	750	850
NO. of workers	80	105	120	165	100	90	60	40

Ans: Positively skewed