



INDIAN SCHOOL AL WADI AL KABIR

DEPARTMENT OF COMMERCE

MEASURES OF DISPERSION

1. Define the following:

a. Dispersion:

Dispersion is the extent to which values in a distribution differ from the average of the distribution.

b. Standard Deviation:

It is the positive square root of the mean of squared deviations from mean.

c. Variance:

It is the square of the standard deviation.

d. Co-efficient of variation:

It is the relative measure of standard deviation.

2. Why is standard deviation regarded as the best measure of dispersion?

Standard deviation is the best measure of dispersion because it possesses most of the characteristics of a good measure of dispersion. Its superiority over the other measures of dispersion is because of the following factors:

- a. It is based on all the values of the data.
- b. It is rigidly defined.
- c. It is capable of further algebraic treatment, i.e.: we can find the combined standard deviation given the standard deviation of two or more groups.
- d. It is not very much affected by fluctuations of sampling.

3. How is standard deviation independent of origin but not of scale?

Standard deviation is not affected by the value of the constant from which deviations are calculated. The value of the constant does not figure in the standard deviation formulae. Therefore, standard deviation is independent

of origin. Since standard deviation is based on all values, therefore, a change in even one of the values affects the value of standard deviations. Thus, standard deviation is not independent of scale.

4. DIRECT METHOD (ACTUAL MEAN METHOD):

▪ **STEPS:**

- calculate mean & find deviations of the data from the mean
- square all deviations and obtain total of deviations.
- divide the squared deviation by no. of items.
- find square root.

➤ **FORMULA:**

$$\sigma = \sqrt{\frac{\sum d^2}{n}}$$

- $d^2 = \text{SQUARE OF DEVIATION.}$
- $N = \text{NO. OF ITEMS}$
- $\sigma = \text{STANDARD DEV}$

➤ **COEFFICIENT OF S.D:** $\frac{\sigma}{\bar{x}}$

5. ASSUMED MEAN METHOD:

- STEPS:
- take any value of series as assumed mean.
 - from this assumed mean, take deviation.
 - take square of deviations & obtain the total of squares.

FORMULA:

$$\sigma = \sqrt{\frac{\sum d^2}{n} - \left(\frac{\sum d}{n}\right)^2}$$

Coefficient of variation:-

Coefficient of variation is calculated by the following formula

$$\text{C.V} = \frac{\sigma}{\bar{X}} \times 100$$

Where,

C.V = coefficient of variation
 σ = standard deviation.
 \bar{X} = Arithmetic Mean.

6. STANDARD DEVIATION IN CONTINUOUS SERIES:

a. ACTUAL MEAN METHOD:

STEPS:

- OBTAIN MID VALUE, CALCULATE ARITHMETIC MEAN AND TAKE DEVIATIONS FROM MID VALUES OF ALL ITEMS.
- SQUARE DEVIATIONS.
- MULTIPLY THE SQUARES OF DEVIATIONS WITH THEIR RESPECTIVE FREQUENCIES.
- DIVIDE THE TOTAL BY THE NO. OF FREQUENCIES.
- OBTAIN ROOT OF VALUE

FORMULA:

$$\sigma = \sqrt{\frac{\sum f d^2}{\sum f}}$$

b. ASSUMED MEAN METHOD:

FORMULA:

$$\sigma = \sqrt{\frac{\sum f d^2}{N} - \left(\frac{\sum f d}{N}\right)^2}$$

c. STEP DEVIATION METHOD:

FORMULA:

$$\sigma = \sqrt{\frac{\sum f d'^2}{\sum f} - \left(\frac{\sum f d'}{\sum f}\right)^2} \times C$$

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