

Statistics Practical

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Introduction

Important Terms

Population A collection of similar items of interest.

Sample Any subset of a population

Measures of Central Tendency

Important Formulae

- $M_o = 3M_e - 2\bar{X}$

Moments, SKewness, and Kurtosis

Problems

Moment Conversion: -1, 5, 20, 90.

The first four moments around 2 of a data set are -1, 5, 20, 90. Determine μ_3 and kurtosis.

Solution

$$\mu'_1 = \frac{\sum_{i=1}^n}{n} - 1$$

$$\Rightarrow \frac{\sum x_i}{n} - a = -1$$

$$\Rightarrow \bar{x} - a = a - 1$$

Thus, $b = a - k = a - a + 1 = 1$

Without knowing the initial origin, we can compute central moments, but not other raw moments.

Time Series

Concept of time series

A time series is a collection of observations arranged chronologically (belonging to different time period, e.g., week, month, year etc.)

According to the Australian Bureau of Statistics,

“A time series is a collection of observations of well-defined data items obtained through repeated measurements over time.”

Mathematically, a time series is $Y_t = f(t); t = t_1, t_2, \dots, t_n$

Examples

- i. No. of accidents by day
- ii. Tea production in Bangladesh by year

Components of time series

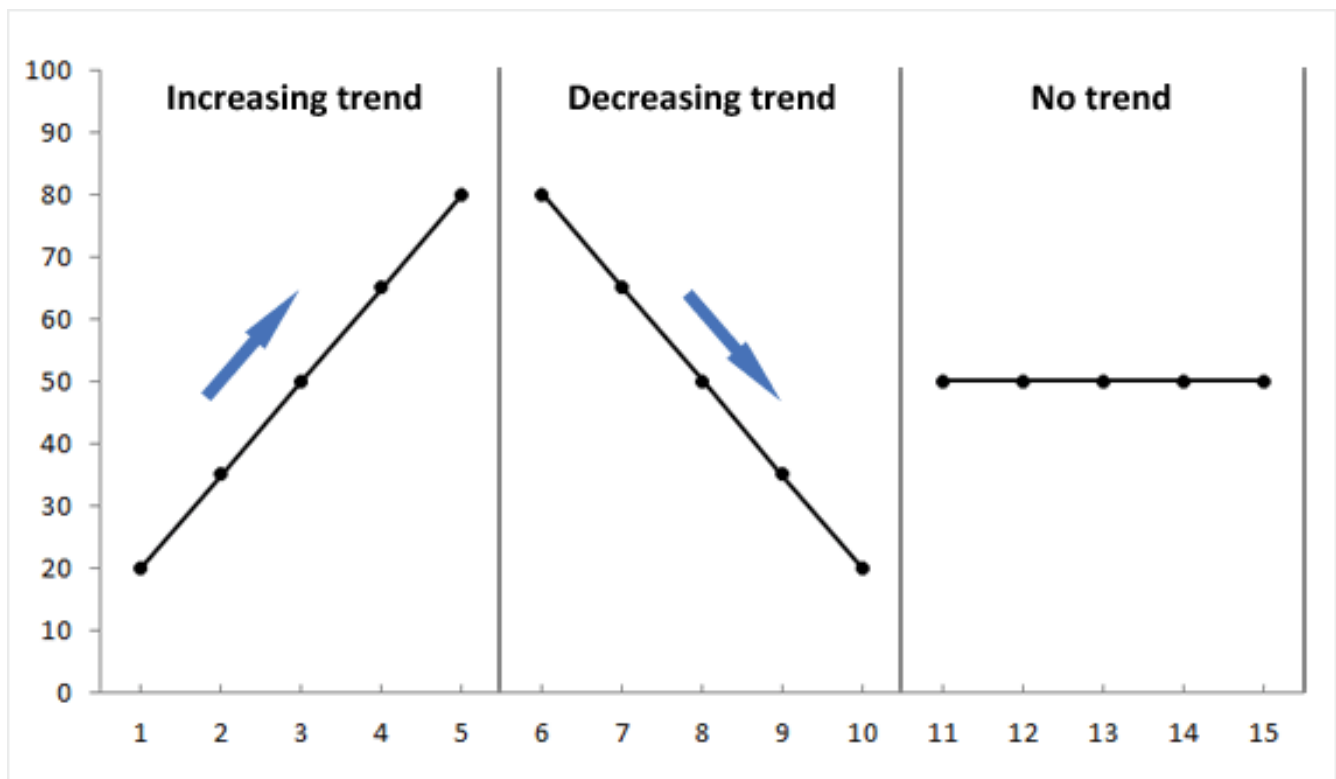
- a. Trend
- b. Seasonal variation
- c. Cyclic variation
- d. Irregular/random variation

Elaboration on the concepts

Trend

Increase or decrease in the values over time. There are two types of trends.

- i. Upward trend
- ii. Downward trend



Both types can be further divided into two kinds of trends.

- i. Linear trend
- ii. Non-linear trend

Seasonal variation

Changes in values due to season within a year, due to climate or festival.

Examples

- i. The increase of demand of dates during Ramadan
- ii. The increase of demand of umbrella during the rainy season

Cyclic variation

Recurrent upward or downward movements, when the period of cycle is greater than a year, but the period is not fixed.