

■ The Concept of Statistics.

Statistics is a group of methods used to collect, analyze, present, interpret, study, manipulate data and draw realistic conclusions from the data.

The concept of statistics can be divided into two categories, Descriptive statistics and Inferential statistics.

- Descriptive statistics: The methods used for organizing, displaying and describing data using tables, graphs, measures of summary etc. are descriptive statistics.

Example - A bar graph describing the number of students in each faculty of an institution.

- Inferential statistics: The methods that use the sample results to help make decisions or realistic predictions about a population is called inferential statistics.

Example - The likelihood of a person getting diagnosed with obesity given they have a BMI over average.

■ Differences between discrete and continuous variables.

All quantifiable variables can be differentiated into two categories – discrete variables, continuous variables.

The differences between discrete and continuous variables are given below:

- i. Characterization: Discrete variables are such variables that can assume only one value. But continuous variables are variables that can assume any value over a certain interval or intervals.
- ii. Countability: Discrete variables can be counted. But, continuous variables can only be measured.
- iii. Values: All discrete variables assume positive integer values. But, continuous variables can assume fractional values as well.

iv. Graph : Discrete variable graphs have discontinuity in them. Continuous variable graphs don't have any discontinuity.

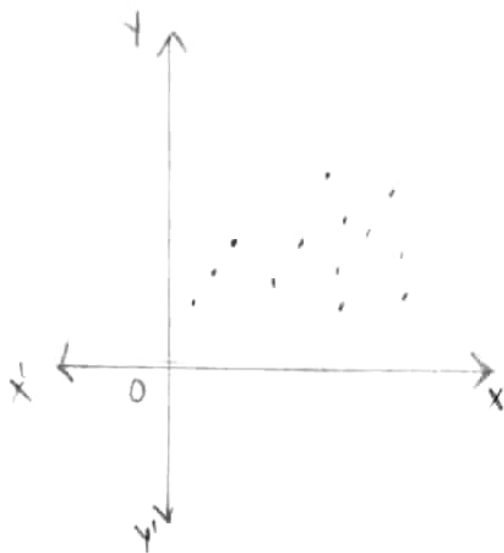


Fig: Discrete variable graph.

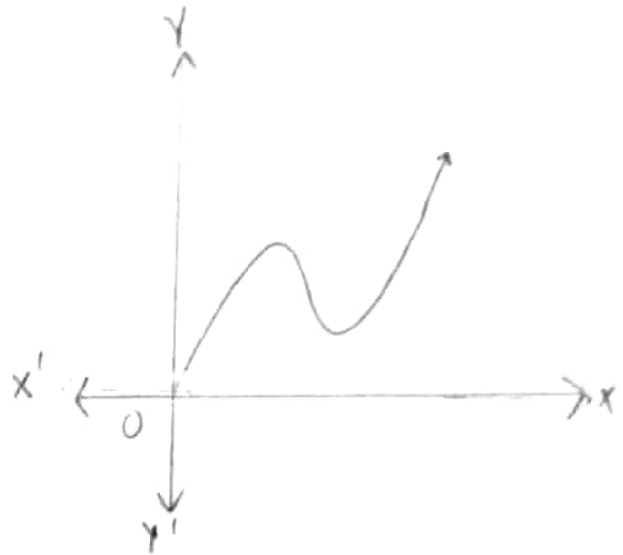


Fig: Continuous variable graph.

v. Examples : Example of discrete variable is - the number of cars in a parking lot.

Example of continuous variable is - the height of students in class-XI.

■ Scales of measurement.

Scales of measurement are ways to define how the data has been grouped/defined.

Scales of measurement are of four types - Nominal scale, Ordinal scale, Interval scale, Ratio scale.

i. Nominal scale : The scale where values are arranged by name without any numeric values is called nominal scale. It is mutually exclusive and exhaustive.

Example - Alif, Saimon, Bibi - are the names of three students in class - 5.

ii. Ordinal scale : Ordinal scale identifies the value of a variable and arranges them meaningfully. The classification is mutually exclusive and exhaustive.

Example - The movie 'Sindbad' is rated R in Rotten Tomatoes.

iii. Interval scale - A definition of distance between the categories in terms of fixed and equal units is defined in this scale.

Example - The temperature of Dhaka on average, lies around 35°C .

iv. Ratio scale : ~~The so interval scale~~ The ratio scale categorizes variables with the order and number of the object between the values of the scale.

Example - Rony earns Tk. 50,000 per month. The information in the stem is also ratio scale.

■ Find $\sum (2x_i + 1)$, $\sum x_i^2 + 2$, $(\sum x_i)^2$ and $\prod x_i$ for the following:

A primary school's 10 student's weight (kg) in class one are as follows:

18, 20, 12, 16, 17, 15, 11, 14, 12 and 18 respectively.

Solution:

Let, $i = 1, 2, 3, \dots, 10$.

x_i represents the weight (kg) of the students in class one of the institution.

Now,

$$\bullet \sum (2x_i + 1)$$

$$= \sum_{i=1}^{10} (2x_i + 1) \quad [\text{defining } i].$$

$$= (2 \cdot 18 + 1) + (2 \cdot 20 + 1) + (2 \cdot 12 + 1) + (2 \cdot 16 + 1) + (2 \cdot 17 + 1) + (2 \cdot 15 + 1) + (2 \cdot 11 + 1) + (2 \cdot 14 + 1) + (2 \cdot 12 + 1) + (2 \cdot 18 + 1).$$

$$= 316$$

$$\bullet \sum x_i^2 + 2.$$

$$= \sum_{i=1}^{10} x_i^2 + 2.$$

$$= \{(18)^2 + 2\} + \{(20)^2 + 2\} + \{(12)^2 + 2\} + \{(16)^2 + 2\} + \{(17)^2 + 2\} + \{(15)^2 + 2\} + \{(11)^2 + 2\} + \{(14)^2 + 2\} + \{(12)^2 + 2\}.$$

$$= 2443.$$

$$\bullet \sum_{i=1}^{10} x_i^2$$

$$= 18^2 + 20^2 + 12^2 + 16^2 + 17^2 + 15^2 + 11^2 + 14^2 + 12^2.$$

$$= 23409$$

$$\bullet \prod_{i=1}^{10} x_i$$

$$= 18 \times 20 \times 12 \times 16 \times 17 \times 15 \times 11 \times 14 \times 12 \times 18$$

$$= 586207958400.$$