

Meaning of 'Statistics'

- The Word '*Statistics*' appears to have been derived from the Latin word "Status" meaning "a political state".
- Some believe that the word has its root in the German word '*Statistik*'.
- Statistics was simply the collection of numerical data

Definition

- Defined as *the scientific study of handling quantitative information.*
- *It embodies the methodology of collection, Classification, Description and Interpretation of data obtained through the conduct of surveys and experiments.*
- *The essential purpose is to describe and draw inferences about the numerical properties of populations.*

Importance of the study of Statistics

- Knowing the **performance** of his students in different subjects
- **Comparing their achievements** with students of other institutions
- Identifying **those students who require his help** in order to secure more marks

- Selecting them for **admission to higher courses or for jobs** based on their performance in entrance/competitive examinations
- **Developing norms** for achievement and psychological tests
- **Constructing and standardizing** scholastic ability tests etc.

Steps involved in the Statistical Method

- I. Collection of Data
- II. Classification & Tabulation
- III. Statistical Analysis of data
- IV. Drawing of inferences

Forming a Frequency Distribution

- **Frequency distribution** is a table in which raw scores are arranged in the form of classes and class frequencies.
- In a frequency distribution table, there will be **number of classes of equal size**. The number of score values which **fall in a particular class interval** is known as the **frequency of that class**.

Variate	Tally marks	Frequency
15		4
16	≡	6
18	≡	6
20	≡	6
24	≡	5
25	≡	5
27		3
28		3
29		1
30		1
Total		40

Class	Tally Marks	Frequency
11 - 15		2
16 - 20		3
21 - 25		3
26 - 30	≡	5
31 - 35	≡	6
36 - 40	≡	6
41 - 45		3
46 - 50		2
Total		30

Example

- **Step I:** Find the **maximum and the minimum values**. The difference between the two is called the **Range**. Here the Range is $96-4 = 92$.
- Usually we smoothen the maximum and minimum values such that the range becomes a **multiple of 5**.
- So, taking the maximum value as 100 and the minimum value as 0, we have the Range $100-0 = 100$.

- **Step II:** Determine the width 'i' of the class interval. Usually it is desirable to have $i = 5, 10, 15, 20, 25, 50, 100$ and the multiples of 100.

- **Step III:** Determine the number of class intervals (n), using the relation

Range

$$n = \frac{\text{Range}}{\text{---}}$$

(i)

- Usually, it is desirable to have 'n' ranging between 5 and 15. Of course it is not a hard and fast rule.
- When considered Step II & III together, in our example we can have $i = 10$;
hence $n = 100/10 = 10$.

Classification according to class intervals

- **Class Limits** – lower and upper limit
- **Class intervals** – difference between upper and lower limit
- **Class frequency** – number of observations corresponding to the particular class
- **Class mid-point** – $\frac{\text{upper limit of the class} + \text{lower limit of the class}}{2}$
- **Two methods of class intervals**
 - A. Exclusive method
 - B. Inclusive method

- **Step IV** : Write the class intervals (C.I) either in the **Exclusive type** (where the upper limit of the class becomes the lower limit of the succeeding class) or **Inclusive type** (Where both the upper and lower limits of the class are included in the same class interval; naturally the upper limit of a class is one score less than the lower limit of the succeeding class).

Exclusive class interval type	Inclusive class interval type
0-10	0-9
10-20	10-19
20-30	20-29
30-40	30-39
40-50	40-49
50-60	50-59
60-70	60-69
70-80	70-79
80-90	80-89
90-100	90-99

- **Step V:** Check the individual values, and mark each one as a 'tally' against the C.I. in which it falls. For making counting easy, every fifth tally mark against any class interval is made as a horizontal line.
- **Step VI:** Count the tally marks against each and every class interval and put the number, which is the frequency of that class.