Unit - 1

* ## Data:-

It is a collection of information
- Data can be of two types:
  1.) grouped data and,
  2.) Ungrouped data.

* ## Grouped data:-

When the data is organized
into some specific manner, then it is
termed as grouped data.
(i.e., in the form of class intervals)

* ## Ungrouped data:

When the data is taken
randomly ~~it it~~ it is termed as
ungrouped data.

* ## frequency:-

It is the number showing
how many times a particular observation
is repeated.

for eg. In the given data 1 2 3 5 5 6
we can say that the frequency of
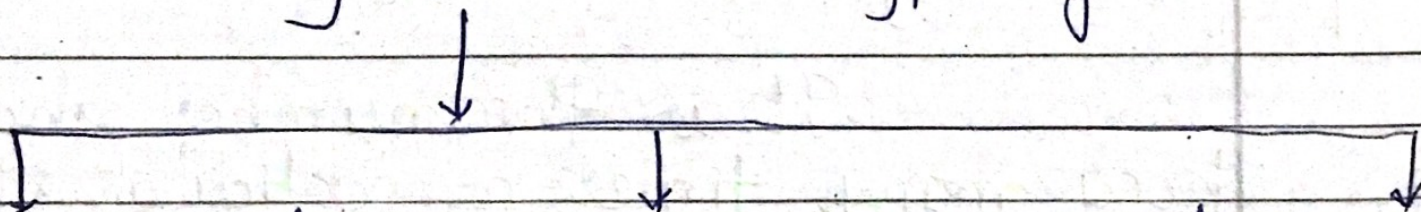observation "5" is 2.

* Measure of Central tendency
or,
Measure of Central location.

- Some of these stastical measures define, in some sense, the centre of a set of data and consequently are called measure of central tendency or measure of central location.

- The most commonly used measure of central tendency are the mean, median, mode, geometric mean & harmonic meem.

* Mean :-

Mainly, there are 3 types of Mean.

↓

1.) Arithmetic mean.   2.) Geometric mean.   3.) Harmonic mean

* **Arithmetic mean:**

The arithmetic mean or simply the mean is the most popular & commonly used measure of central tendency.

Def: The arithmetic mean of set of observations is equal to the sum of all the observations divided by the total number of observations.

for eg. The arithmetic mean of a set of 5 observations 14, 16, 19, 25 and 21 is,

$$\frac{14 + 16 + 19 + 25 + 21}{5} = \frac{95}{5} = 19.$$

⟶ Now, Mainly we are given three types of data, which are,

1.) Individual observation.
   ⊛ like woise.
   $X_1 \quad X_2 \quad X_3 \quad \dots \quad X_n$

2.) Discrete Series.
   ⊛ like woise, $X_1 \quad X_2 \quad X_3 \quad \dots \quad X_n$
   $f_1, \quad f_2 \quad f_3 \quad \dots \quad f_n$

3.) Continuous Series:
like coise,
class are given with the frequencies.

* __Median:-__

The median of a set of observations arranged in an ascending or descending order of magnitude is defined as the middle value or the arithmetic mean of two middle values according as the number of observations is odd or even respectively.

Thus median of distribution is that value of the variable which exceeds and its exceeded by the same number of observations

* __Geometric Mean:-__

The geometric mean, usually denoted as G.M. of a set of n observations $X_1, X_2, \ldots, X_n$ is the nth root of their product. That is,

$$G.M. = \sqrt[n]{X_1 \times X_2 \times \ldots \times X_n} = (X_1 \cdot X_2 \ldots X_n)^{1/n}$$

- Calculation of G.M. (Individual observations)

Geometric mean of set of n observations $X_1, X_2, \ldots, X_n$ is given by,

$$G.M. = (X_1 \cdot X_2 \cdot \ldots \cdot X_n)^{1/n}$$

Taking logarithms of both sides, we obtain,

$$\log G.M. = \frac{1}{n} \log (X_1 \cdot X_2 \ldots \cdot X_n).$$

$$= \frac{1}{n} \left(\log X_1 + \log X_2 + \ldots + \log X_n \right)$$

$$= \frac{1}{n} \Sigma \log X.$$

$$G.M. = At \; \text{Antilog} \left[\frac{1}{n} \Sigma \log X \right].$$

→ Thus, G.M. of a set of observations is the antilog of arithmetic mean of their logarithms.

✳ Harmonic Mean:-

The harmonic mean, usually denoted by H.M., is defined as the reciprocal of the arithmetic mean of

the resiprocals of the given set of observations.

$$H.M. = \frac{n}{\frac{1}{x_1} + \frac{1}{x_2} + \cdots + \frac{1}{x_n}} = \frac{n}{\sum \frac{1}{x}}$$

✳ Mode:-

The mode of a set of observations is that value which appears most frequently or with the greatest frequency. each is no

If two or more values appear with the same greatest frequency, each is mode. If no value is repeated, there is no mode.

eg. 1) The mode (or modal value) of the no's.
1 2 2 3 5 6 6 6   is 6.

2.) The mode of no's,
1 2 2 2   4 5 6 6 6 is 2 & 6 both.

→ Such data is called bimodal.

3) The numbers 1 2 3 5 7 9 has no mode, since no number is repeated