1 Arithmetic Mean. The most common one is the arithmetic mean (Mean)
If $x_1, x_2, \dots, x_n$ are the individual values
Then the mean $\bar{X}$ is given by

$$\bar{X} = \frac{\sum_{i=1}^{n} x_i}{n}$$

n is the sample size

Properties of Arithmetic Mean

1 It is rigidly defined

2 It is based on all observations

3 It is easy to comprehend ~~compute calculate~~

4 It is simple to calculate

5 the presence of extreme observations has the least impact on it

6 The sum of deviation of the items from the arithmetic mean is always zero

7 The sum of the squared deviations of the items from A. M. is minimum, which is less than the sum of the squared deviations of the items from any other values

8. If each item in the series is replaced by the mean, then the sum of these substitutions will be equal to the sum of the individual items. it is amenable to mathematical treament or properties.

Ex: The marks obtained by 6 students in a class test are 20, 22, 24, 26, 28, 30. Find the mean

Solution:

$$\bar{X} = \frac{\sum_{i=1}^{n} x_i}{n}$$

$$\sum_{i=1}^{6} x_i = 20 + 22 + 24 + 26 + 28$$
$$= 150$$

$$\bar{X} = \frac{150}{6}$$
$$= 25$$

Ex 2: For the following data
-1, -2, 0, 1, 4, 6
Find mean

solution

$$\bar{X} = \frac{(-1-2+0+1+4+6)}{6}$$
$$= \frac{8}{6}$$
$$= 1.3333$$

Ex 3: If the arithmetic mean of 14 observations (26, 12, 14, 15, X, 17, 9, 11, 18, 16, 28, 20, 22, 8) is 17

Find the missing value.

solution:

$$\bar{X} = \frac{\sum_{i=1}^{n} x_i}{n}$$

$$\sum_{i=1}^{14} x_i = (26 + 12 + 14 + 15 + X + 17 + 9 + 11 + 18 + 16 + 28 + 20 + 22 + 8)$$

$$= (216 + X)$$

$$17 = \frac{(216 + x)}{14}$$

$$216 + x = (17)(14)$$

$$216 + x = 238$$

$$x = 238 - 216$$

$$= 22$$

∴ The missing values is equal to $\boxed{22}$

Median: is the middle value of the numbes when all the values are arranged in order of magnitude from smallest to the largest.
If the number of data points is odd, then the value of the middle number is the median.
However, if the number of data points is even, then the two values of the middle

numbers are averaged to obtain the medain

Example: For the following data
(35, 20, 22, 24, 26, 28, 30) Find median

Solution: First we arrange the data

20, 22, 24, 26, 28, 30, 35

$$\text{Median} = X_{\frac{n+1}{2}}$$

$$= X_{\frac{7+1}{2}}$$

$$= X_4$$

$$= 26$$

Example: For the following data
(-1, 0, -3, 5, 9, 6) Find median

Solution: we arranged data
9, 6, 5, -1, 0, -3

$$\text{Median} = \frac{X_{\frac{n}{2}} + X_{\frac{n}{2}+1}}{2}$$

$$= \frac{X_{\frac{6}{2}} + X_{\frac{6}{2}+1}}{2}$$

$$= \frac{X_3 + X_4}{2}$$

$$= \frac{5-1}{2} = 2$$

Harm.

Mode: The Mode of a sample is the Most frequently observed observation

Example: Let $S=\{2,1,2,4,6,8\}$ Find Mode

Mode $= 2$

Example: Let $S=\{1,0,2,4,9,8\}$ Find Mode

Solution: No Mode is founded.

Example. $S=\{-1,-1,-1,0,1,1,1,2,3,4\}$

Mode $= -1, 1$

Geometric Mean: The geometric Mean is defined as GM and it can be calculated as

$$GM = (X_1 X_2 X_3 \ldots X_n)^{1/n}$$

or $GM = \sqrt[n]{X_1 X_2 X_3 \ldots X_n}$

where n is the sample size.

$$\log_{10} GM = \frac{1}{n}\left[\log_{10} X_1 + \log_{10} X_2 + \log_{10} X_3 + \ldots + \log_{10} X_n\right]$$

$$\log_{10} GM = \frac{1}{n}\sum_{i=1}^{n} \log_{10} X_i$$

$$\therefore GM = \log_{10}^{-1}\left[\frac{1}{n}\sum_{i=1}^{n} \log_{10} X_i\right]$$