

Mean

Median

Mode

Mean

Types

Arithmetic mean

Geometric mean

Harmonic mean



Arithmetic Mean

It is the average of a set of data. To calculate the mean, find the sum of the data and then divide by the number of data.

If $X_1, X_2, X_3, \dots, X_n$ observations

Mean =

$$\frac{X_1 + X_2 + X_3 + \dots + X_n}{n}$$

n

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

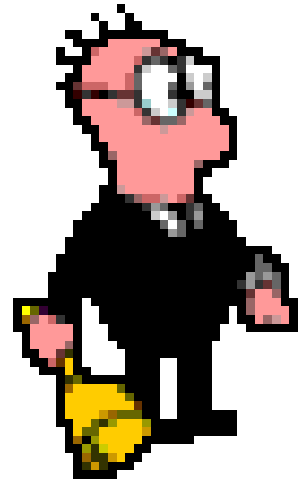
12, 15, 11, 11, 7, 13

First, find the sum of the data.

$$12 + 15 + 11 + 11 + 7 + 13 = 69$$

Then divide by the number of data. $69 / 6 = 11.5$

The mean is 11.5



Geometric Mean

It is the n th-root of the product of all the observations. n is the number of observation in the set.

If $X_1, X_2, X_3, \dots, X_n$ observations

Then $gm = \sqrt[n]{X_1 * X_2 * X_3 * \dots * X_n}$

$$gm = \sqrt[n]{\prod_{i=1}^n x_i}$$

Ages of 10 persons are

24, 27, 29, 30, 15, 14, 9, 2, 7, 45.

Then gm = $\sqrt[n]{X_1 * X_2 * X_3 * \dots * X_n}$

=14.2



Harmonic mean

It is quotient of “number of the given values” and “sum of the reciprocals of the given values. It is reciprocal of arithmetic mean.

If $X_1, X_2, X_3, \dots, X_n$ observations

$$H = \frac{n}{\frac{1}{x_1} + \frac{1}{x_2} + \dots + \frac{1}{x_n}} = \frac{n}{\sum_{i=1}^n \frac{1}{x_i}}$$

To find the Harmonic Mean of 1,2,3,4,5.

Step 1: Calculate the total number of values.

$$N = 5$$

Step 2: Now find Harmonic Mean using the above formula.

$$= 5/(1/1+1/2+1/3+1/4+1/5)$$

$$= 5/(1+0.5+0.33+0.25+0.2)$$

$$= 5/2.2$$

$$\text{So, Harmonic Mean} = 2.19$$



Median

It is the middle number in a set of data when the data is arranged in numerical order.

$X_1, X_2, X_3, \dots, X_n$ observations. If number of observations are odd

$$M = n+1/2$$

E.g. 10, 3, 6, 12, 5

First arranged in numerical order.

3, 5, 6, 10, 12

Here $n=5$, $M = 5 + 1/2 = 3$, 3rd position is median i.e. 6

If number of observations are even then median fall between two observation

$$M = n/2 \text{ to } n+1/2$$

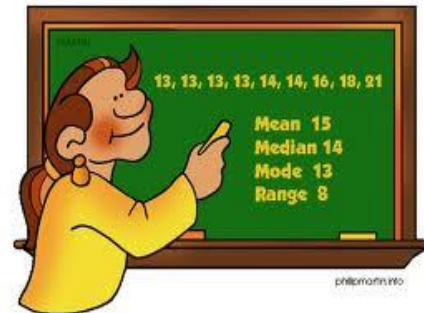
E.g. 10, 3, 6, 12, 5, 14

First arranged in numerical order.

3, 5, 6, 10, 12, 14

Here $n = 6$, $M = 6/2 = 3$ and $6+1/2 = 4$ i.e.

M is > 6 and < 10



Mode

It is the number that occurs the most in a given set of data.

E.g. 12, 15, 11, 11, 7, 13

The mode is 11.

Sometimes a set of data will have more than one mode.

For example, in the following set the numbers both the numbers 5 and 7 appear twice.

$$2, 9, 5, 7, 8, 6, 4, 7, 5$$

5 and 7 are both the mode and this set is said to be bimodal.

Sometimes there is no mode in a set of data.

3, 8, 7, 6, 12, 11, 2, 1

All the numbers in this set occur only once therefore there is no mode in this set.


100, 275, 300, 325, 350, 375, 500

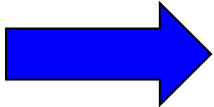
What is the mode ?

100, 275, 300, 325, 350, 375, 500

There is no mode!



Mean  The average

Median  The number or average of the numbers in the middle

Mode  The number that occurs most

