

# Transcendental function : $\sigma$ (Standard Deviation)

Problem No .1

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## Brief Description of $\sigma$ (Standard Deviation)

The Standard Deviation is a measure of how spread out numbers are. It is symbol  $\sigma$  the Greek letter sigma. The formula is easy and is square root of variance. The standard deviation is a statistic that measures the dispersion of a data set relative to its mean. It is calculated as the square root of variance by determining the variation between each data point relative to the mean. If the data points are further from the mean, there is a higher deviation within the data set; thus, the more spread out the data, the higher the standard deviation. It is a statistical measurement in finance that, when applied to the annual rate of return of an investment, sheds light on the historical volatility of that investment. The greater the standard deviation of securities, the greater the variance between each price and the mean, which shows a larger price range. For example, a volatile stock has a high standard deviation, while the deviation of a stable blue-chip stock is usually rather low.

Here is the formula for standard deviation :  $\sigma$  -

$$(StandardDeviation) \sigma = \sqrt{\frac{\sum(x - \bar{x})^2}{n}}$$

$\sigma$  = Lower case sigma  
 $\sum$  = Capital sigma  
 $\bar{x}$  = x bar

To calculate the variance, follow these steps :

- Work out the Mean the simple average of the numbers.
- Then for each number: subtract the Mean and square the result the squared difference.
- Then work out the average of those squared differences.

## Domain & co-domain of $\sigma$ (Standard Deviation)

**Domain** are the values which can go into the function.  
**Domain:** Data set of values which contains natural and real numbers and can be till Infinity.  
**Co domain** are the possibly value which come out of function.  
**Co domain:** Value which are not negative and can be natural number or decimal number.

## Characteristics of $\sigma$ (Standard Deviation)

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Few characteristics which make the  $\sigma$  function unique which are as follows:

- Standard deviation is only used to measure spread or dispersion around the mean of a data set.
- Standard deviation is never negative.
- For data with approximately the same mean, the greater the spread, the greater the standard deviation
- If all values of a data set are the same, the standard deviation is zero because each value is equal to the mean.
- When analyzing normally distributed data, standard deviation can be used in conjunction with the mean in order to calculate data intervals.

# References

[1] [https://en.Wikipedia.org/wiki/Standard\\_deviation](https://en.Wikipedia.org/wiki/Standard_deviation)

[2] <https://www.mathsisfun.com/data/standard-deviation.html>

[3] <https://www.investopedia.com/terms/s/standarddeviation.asp>