

# Stat 328

## Part-1

### Statistical Analysis using Excel

There are many statistical analysis methods can be achieved using Excel

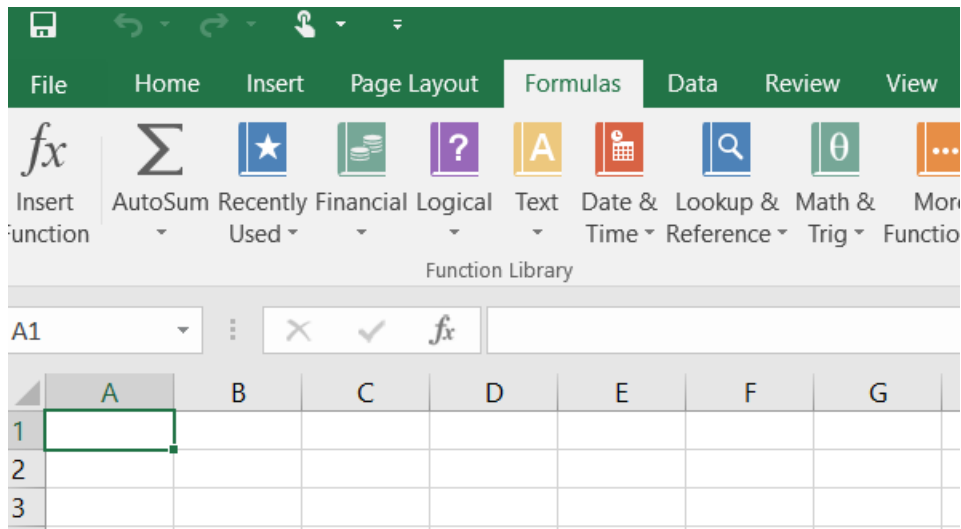
#### 1-1 Functions

Three different type of function can be used in statistics; they are:

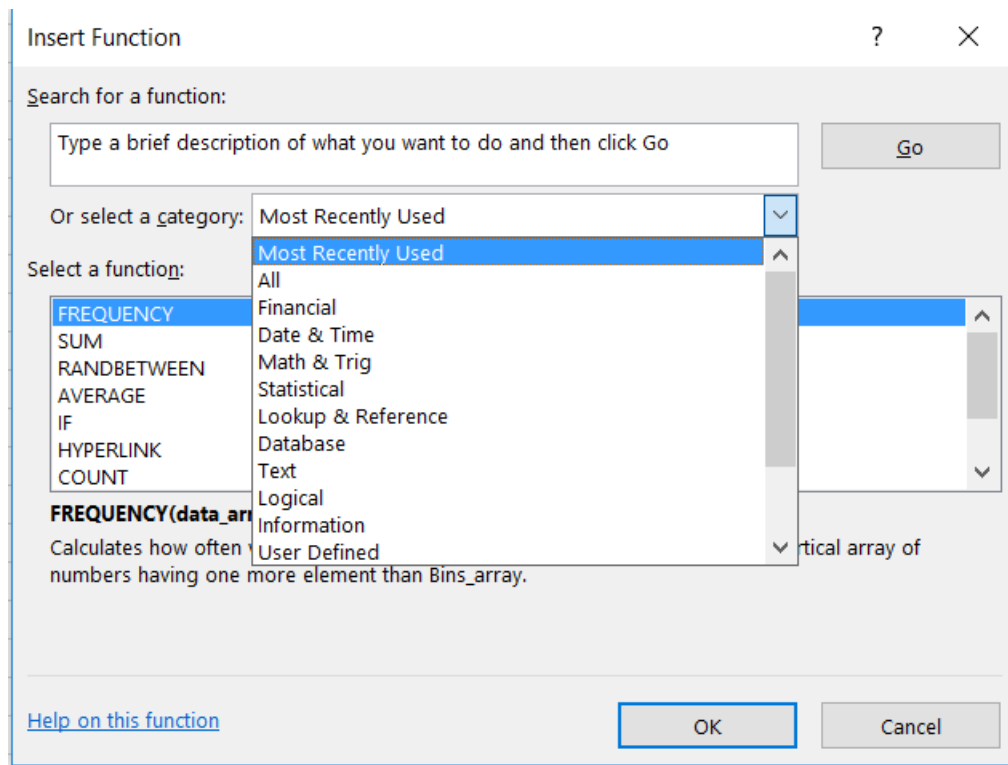
- (a) Statistical Functions
- (b) Mathematical Functions
- (c) Logical Functions

These function can be obtained from excel as:

Click the **Formulas** tab, then select the **Insert Function** command



Then, we get



So, if we select the statistical to get a list of possible statistical functions as follows:

#### Count & Frequency

|                                   |                                                                                                                    |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>COUNT</u></a>      | Returns the number of numerical values in a supplied set of cells or values                                        |
| <a href="#"><u>COUNTA</u></a>     | Returns the number of non-blanks in a supplied set of cells or values                                              |
| <a href="#"><u>COUNTBLANK</u></a> | Returns the number of blank cells in a supplied range                                                              |
| <a href="#"><u>COUNTIF</u></a>    | Returns the number of cells (of a supplied range), that satisfy a given criteria                                   |
| <a href="#"><u>COUNTIFS</u></a>   | Returns the number of cells (of a supplied range), that satisfy a set of given criteria <i>(New in Excel 2007)</i> |
| <a href="#"><u>FREQUENCY</u></a>  | Returns an array showing the number of values from a supplied array, which fall into specified ranges              |

#### Finding the Largest & Smallest Values

|                               |                                                                                                                                                                        |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>MAX</u></a>    | Returns the largest value from a list of supplied numbers                                                                                                              |
| <a href="#"><u>MAXA</u></a>   | Returns the largest value from a list of supplied values, counting text and the logical value FALSE as the value 0 and counting the logical value TRUE as the value 1  |
| <a href="#"><u>MAXIFS</u></a> | Returns the largest value from a subset of values in a list that are specified according to one or more criteria. <i>(New in Excel 2016)</i>                           |
| <a href="#"><u>MIN</u></a>    | Returns the smallest value from a list of supplied numbers                                                                                                             |
| <a href="#"><u>MINA</u></a>   | Returns the smallest value from a list of supplied values, counting text and the logical value FALSE as the value 0 and counting the logical value TRUE as the value 1 |
| <a href="#"><u>MINIFS</u></a> | Returns the smallest value from a subset of values in a list that are specified according to one or more criteria. <i>(New in Excel 2016)</i>                          |
| <a href="#"><u>LARGE</u></a>  | Returns the Kth LARGEST value from a list of supplied numbers, for a given value K                                                                                     |
| <a href="#"><u>SMALL</u></a>  | Returns the Kth SMALLEST value from a list of supplied numbers, for a given value K                                                                                    |

#### Percentiles, Quartiles & Rank

|                                        |                                                                                                                                                                                                                           |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>PERCENTILE</u></a>      | Returns the K'th percentile of values in a supplied range, where K is in the range 0 - 1 (inclusive) <i>(Replaced by Percentile.Inc function in Excel 2010)</i>                                                           |
| <a href="#"><u>PERCENTILE.INC</u></a>  | Returns the K'th percentile of values in a supplied range, where K is in the range 0 - 1 (inclusive) <i>(New in Excel 2010 - replaces the Percentile function)</i>                                                        |
| <a href="#"><u>PERCENTILE.EXC</u></a>  | Returns the K'th percentile of values in a supplied range, where K is in the range 0 - 1 (exclusive) <i>(New in Excel 2010)</i>                                                                                           |
| <a href="#"><u>QUARTILE</u></a>        | Returns the specified quartile of a set of supplied numbers, based on percentile value 0 - 1 (inclusive) <i>(Replaced by Quartile.Inc function in Excel 2010)</i>                                                         |
| <a href="#"><u>QUARTILE.INC</u></a>    | Returns the specified quartile of a set of supplied numbers, based on percentile value 0 - 1 (inclusive) <i>(New in Excel 2010 - replaces the Quartile function)</i>                                                      |
| <a href="#"><u>QUARTILE.EXC</u></a>    | Returns the specified quartile of a set of supplied numbers, based on percentile value 0 - 1 (exclusive) <i>(New in Excel 2010)</i>                                                                                       |
| <a href="#"><u>RANK</u></a>            | Returns the statistical rank of a given value, within a supplied array of values <i>(Replaced by Rank.Eq function in Excel 2010)</i>                                                                                      |
| <a href="#"><u>RANK.EQ</u></a>         | Returns the Mode (the most frequently occurring value) of a list of supplied numbers (if more than one value has same rank, the top rank of that set is returned) <i>(New in Excel 2010 - replaces the Rank function)</i> |
| <a href="#"><u>RANK.AVG</u></a>        | Returns the statistical rank of a given value, within a supplied array of values (if more than one value has same rank, the average rank is returned) <i>(New in Excel 2010)</i>                                          |
| <a href="#"><u>PERCENTRANK</u></a>     | Returns the rank of a value in a data set, as a percentage (0 - 1 inclusive) <i>(Replaced by Percentrank.Inc function in Excel 2010)</i>                                                                                  |
| <a href="#"><u>PERCENTRANK.INC</u></a> | Returns the rank of a value in a data set, as a percentage (0 - 1 inclusive) <i>(New in Excel 2010 - replaces the Percentrank function)</i>                                                                               |
| <a href="#"><u>PERCENTRANK.EXC</u></a> | Returns the rank of a value in a data set, as a percentage (0 - 1 exclusive) <i>(New in Excel 2010)</i>                                                                                                                   |

## Averages

|                                   |                                                                                                                                                                |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>AVERAGE</u></a>    | Returns the Average of a list of supplied numbers                                                                                                              |
| <a href="#"><u>AVERAGEA</u></a>   | Returns the Average of a list of supplied numbers, counting text and the logical value FALSE as the value 0 and counting the logical value TRUE as the value 1 |
| <a href="#"><u>AVERAGEIF</u></a>  | Calculates the Average of the cells in a supplied range, that satisfy a given criteria <i>(New in Excel 2007)</i>                                              |
| <a href="#"><u>AVERAGEIFS</u></a> | Calculates the Average of the cells in a supplied range, that satisfy multiple criteria <i>(New in Excel 2007)</i>                                             |

|                                  |                                                                                                                                              |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>MEDIAN</u></a>    | Returns the Median (the middle value) of a list of supplied numbers                                                                          |
| <a href="#"><u>MODE</u></a>      | Returns the Mode (the most frequently occurring value) of a list of supplied numbers <i>(Replaced by Mode.Sngl function in Excel 2010)</i>   |
| <a href="#"><u>MODE.SNGL</u></a> | Returns the Mode (the most frequently occurring value) of a list of supplied numbers <i>(New in Excel 2010 - replaces the Mode function)</i> |
| <a href="#"><u>MODE.MULT</u></a> | Returns a vertical array of the most frequently occurring values in an array or range of data <i>(New in Excel 2010)</i>                     |
| <a href="#"><u>GEOMEAN</u></a>   | Returns the geometric mean of a set of supplied numbers                                                                                      |
| <a href="#"><u>HARMEAN</u></a>   | Returns the harmonic mean of a set of supplied numbers                                                                                       |
| <a href="#"><u>TRIMMEAN</u></a>  | Returns the mean of the interior of a supplied set of values                                                                                 |

#### Deviation & Variance

|                                |                                                                                                                                                                                                                    |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>AVEDEV</u></a>  | Returns the average of the absolute deviations of data points from their mean                                                                                                                                      |
| <a href="#"><u>DEVSQ</u></a>   | Returns the sum of the squares of the deviations of a set of data points from their sample mean                                                                                                                    |
| <a href="#"><u>STDEV</u></a>   | Returns the standard deviation of a supplied set of values (which represent a sample of a population) <i>(Replaced by Stdev.S function in Excel 2010)</i>                                                          |
| <a href="#"><u>STDEV.S</u></a> | Returns the standard deviation of a supplied set of values (which represent a sample of a population) <i>(New in Excel 2010 - replaces the Stdev function)</i>                                                     |
| <a href="#"><u>STDEVA</u></a>  | Returns the standard deviation of a supplied set of values (which represent a sample of a population), counting text and the logical value FALSE as the value 0 and counting the logical value TRUE as the value 1 |
| <a href="#"><u>STDEV.P</u></a> | Returns the standard deviation of a supplied set of values (which represent an entire population) <i>(Replaced by Stdev.P function in Excel 2010)</i>                                                              |
| <a href="#"><u>STDEV.P</u></a> | Returns the standard deviation of a supplied set of values (which represent an entire population) <i>(New in Excel 2010 - replaces the Stdevp function)</i>                                                        |
| <a href="#"><u>STDEVPA</u></a> | Returns the standard deviation of a supplied set of values (which represent an entire population), counting text and the logical value FALSE as the value 0 and counting the logical value TRUE as the value 1     |
| <a href="#"><u>VAR</u></a>     | Returns the variance of a supplied set of values (which represent a sample of a population) <i>(Replaced by Var.S function in Excel 2010)</i>                                                                      |

|                                     |                                                                                                                                                                                                          |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>VAR.S</u></a>        | Returns the variance of a supplied set of values (which represent a sample of a population) <i>(New in Excel 2010 - replaces the Var function)</i>                                                       |
| <a href="#"><u>VARA</u></a>         | Returns the variance of a supplied set of values (which represent a sample of a population), counting text and the logical value FALSE as the value 0 and counting the logical value TRUE as the value 1 |
| <a href="#"><u>VARP</u></a>         | Returns the variance of a supplied set of values (which represent an entire population) <i>(Replaced by Var.P function in Excel 2010)</i>                                                                |
| <a href="#"><u>VAR.P</u></a>        | Returns the variance of a supplied set of values (which represent an entire population) <i>(New in Excel 2010 - replaces the Varp function)</i>                                                          |
| <a href="#"><u>VARPA</u></a>        | Returns the variance of a supplied set of values (which represent an entire population), counting text and the logical value FALSE as the value 0 and counting the logical value TRUE as the value 1     |
| <a href="#"><u>COVAR</u></a>        | Returns population covariance (i.e. the average of the products of deviations for each pair within two supplied data sets) <i>(Replaced by Covariance.P function in Excel 2010)</i>                      |
| <a href="#"><u>COVARIANCE.P</u></a> | Returns population covariance (i.e. the average of the products of deviations for each pair within two supplied data sets) <i>(New in Excel 2010 - replaces the Covar function)</i>                      |
| <a href="#"><u>COVARIANCE.S</u></a> | Returns sample covariance (i.e. the average of the products of deviations for each pair within two supplied data sets) <i>(New in Excel 2010)</i>                                                        |

#### Confidence Intervals

|                                        |                                                                                                                                                  |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>CONFIDENCE</u></a>      | Returns the confidence interval for a population mean, using a normal distribution <i>(Replaced by Confidence.Norm function in Excel 2010)</i>   |
| <a href="#"><u>CONFIDENCE.NORM</u></a> | Returns the confidence interval for a population mean, using a normal distribution <i>(New in Excel 2010 - replaces the Confidence function)</i> |
| <a href="#"><u>CONFIDENCE.T</u></a>    | Returns the confidence interval for a population mean, using a Student's t distribution <i>(New in Excel 2010)</i>                               |

#### Trend Line Functions

|                                  |                                                                                                                                                       |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>FORECAST</u></a>  | Predicts a future point on a linear trend line fitted to a supplied set of x- and y- values                                                           |
| <a href="#"><u>INTERCEPT</u></a> | Calculates the best fit regression line, through a supplied series of x- and y- values and returns the value at which this line intercepts the y-axis |
| <a href="#"><u>LINEST</u></a>    | Returns statistical information describing the trend of the line of best fit, through a supplied series of x- and y- values                           |

|                               |                                                                                                                              |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>SLOPE</u></a>  | Returns the slope of the linear regression line through a supplied series of x- and y- values                                |
| <a href="#"><u>TREND</u></a>  | Calculates the trend line through a given set of y-values and returns additional y-values for a supplied set of new x-values |
| <a href="#"><u>GROWTH</u></a> | Returns numbers in a exponential growth trend, based on a set of supplied x- and y- values                                   |
| <a href="#"><u>LOGEST</u></a> | Returns the parameters of an exponential trend for a supplied set of x- and y- values                                        |
| <a href="#"><u>STEYX</u></a>  | Returns the standard error of the predicted y-value for each x in the regression line for a set of supplied x- and y- values |

|                                     |                                                                                                                                                            |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>PERMUT</u></a>       | Returns the number of permutations for a given number of objects                                                                                           |
| <a href="#"><u>PERMUTATIONA</u></a> | Returns the number of permutations for a given number of objects (with repetitions) that can be selected from the total objects <i>(New in Excel 2013)</i> |

---

#### Distribution & Tests of Probability

|                                   |                                                                                                                                                        |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>BETADIST</u></a>   | Returns the cumulative beta probability density function <i>(Replaced by Beta.Dist function in Excel 2010)</i>                                         |
| <a href="#"><u>BETA.DIST</u></a>  | Returns the cumulative beta distribution function or the beta probability density function <i>(New in Excel 2010 - replaces the Betadist function)</i> |
| <a href="#"><u>BETAINV</u></a>    | Returns the inverse of the cumulative beta probability density function <i>(Replaced by Beta.Inv function in Excel 2010)</i>                           |
| <a href="#"><u>BETA.INV</u></a>   | Returns the inverse of the cumulative beta probability density function <i>(New in Excel 2010 - replaces the Betainv function)</i>                     |
| <a href="#"><u>BINOMDIST</u></a>  | Returns the individual term binomial distribution probability <i>(Replaced by Binom.Dist function in Excel 2010)</i>                                   |
| <a href="#"><u>BINOM.DIST</u></a> | Returns the individual term binomial distribution probability <i>(New in Excel 2010 - replaces the Binomdist function)</i>                             |

|                                |                                                                                                                                                                                      |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u><b>BINOM.DIST.RANGE</b></u> | Returns the probability of a trial result using a binomial distribution <i>(New in Excel 2013)</i>                                                                                   |
| <u><b>NEGBINOMDIST</b></u>     | Returns the negative binomial distribution <i>(Replaced by Negbinom.Dist function in Excel 2010)</i>                                                                                 |
| <u><b>NEGBINOM.DIST</b></u>    | Returns the negative binomial distribution <i>(New in Excel 2010 - replaces the Negbinomdist function)</i>                                                                           |
| <u><b>CRITBINOM</b></u>        | Returns the smallest value for which the cumulative binomial distribution is greater than or equal to a criterion value <i>(Replaced by Binom.Inv function in Excel 2010)</i>        |
| <u><b>BINOM.INV</b></u>        | Returns the smallest value for which the cumulative binomial distribution is greater than or equal to a criterion value <i>(New in Excel 2010 - replaces the Critbinom function)</i> |
| <u><b>CHIDIST</b></u>          | Returns the right-tailed probability of the chi-squared distribution <i>(Replaced by Chisq.Dist.Rt function in Excel 2010)</i>                                                       |
| <u><b>CHISQ.DIST.RT</b></u>    | Returns the right-tailed probability of the chi-squared distribution <i>(New in Excel 2010 - replaces the Chidist function)</i>                                                      |
| <u><b>CHISQ.DIST</b></u>       | Returns the chi-squared distribution (probability density or cumulative distribution function) <i>(New in Excel 2010)</i>                                                            |
| <u><b>CHIINV</b></u>           | Returns the inverse of the right-tailed probability of the chi-squared distribution <i>(Replaced by Chisq.Inv.Rt function in Excel 2010)</i>                                         |
| <u><b>CHISQ.INV.RT</b></u>     | Returns the inverse of the right-tailed probability of the chi-squared distribution <i>(New in Excel 2010 - replaces the Chiinv function)</i>                                        |
| <u><b>CHISQ.INV</b></u>        | Returns the inverse of the left-tailed probability of the chi-squared distribution <i>(New in Excel 2010)</i>                                                                        |
| <u><b>CHITEST</b></u>          | Returns the chi-squared statistical test for independence <i>(Replaced by Chisq.Test function in Excel 2010)</i>                                                                     |
| <u><b>CHISQ.TEST</b></u>       | Returns the chi-squared statistical test for independence <i>(New in Excel 2010 - replaces the Chitest function)</i>                                                                 |
| <u><b>CORREL</b></u>           | Returns the correlation coefficient between two sets of values                                                                                                                       |
| <u><b>EXPONDIST</b></u>        | Returns the exponential distribution <i>(Replaced by Expon.Dist function in Excel 2010)</i>                                                                                          |
| <u><b>EXPON.DIST</b></u>       | Returns the exponential distribution <i>(New in Excel 2010 - replaces the Expondist function)</i>                                                                                    |
| <u><b>FDIST</b></u>            | Returns the right-tailed F probability distribution for two data sets <i>(Replaced by F.Dist.Rt function in Excel 2010)</i>                                                          |

|                               |                                                                                                                                                                        |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u><b>F.DIST.RT</b></u>       | Returns the right-tailed F probability distribution for two data sets <i>(New in Excel 2010 - replaces the Fdist function)</i>                                         |
| <u><b>F.DIST</b></u>          | Returns the F probability distribution (probability density or cumulative distribution function) <i>(New in Excel 2010)</i>                                            |
| <u><b>FINV</b></u>            | Returns the inverse of the right-tailed F probability distribution for two data sets <i>(Replaced by F.Inv.Rt function in Excel 2010)</i>                              |
| <u><b>F.INV.RT</b></u>        | Returns the inverse of the right-tailed F probability distribution for two data sets <i>(New in Excel 2010 - replaces the Finv function)</i>                           |
| <u><b>F.INV</b></u>           | Returns the inverse of the Cumulative F distribution <i>(New in Excel 2010)</i>                                                                                        |
| <u><b>FISHER</b></u>          | Returns the Fisher transformation                                                                                                                                      |
| <u><b>FISHERINV</b></u>       | Returns the inverse of the Fisher transformation                                                                                                                       |
| <u><b>FTEST</b></u>           | Returns the result of an F-Test for 2 supplied data sets <i>(Replaced by F.Test function in Excel 2010)</i>                                                            |
| <u><b>F.TEST</b></u>          | Returns the result of an F-Test for 2 supplied data sets <i>(New in Excel 2010 - replaces the Ftest function)</i>                                                      |
| <u><b>GAMMADIST</b></u>       | Returns the gamma distribution <i>(Replaced by Gamma.Dist function in Excel 2010)</i>                                                                                  |
| <u><b>GAMMA.DIST</b></u>      | Returns the gamma distribution <i>(New in Excel 2010 - replaces the Gammadist function)</i>                                                                            |
| <u><b>GAMMAINV</b></u>        | Returns the inverse gamma cumulative distribution <i>(Replaced by Gamma.Inv function in Excel 2010)</i>                                                                |
| <u><b>GAMMA.INV</b></u>       | Returns the inverse gamma cumulative distribution <i>(New in Excel 2010 - replaces the Gammainv function)</i>                                                          |
| <u><b>GAMMA</b></u>           | Return the gamma function value for a supplied number <i>(New in Excel 2013)</i>                                                                                       |
| <u><b>GAMMALN</b></u>         | Calculates the natural logarithm of the gamma function for a supplied value                                                                                            |
| <u><b>GAMMALN.PRECISE</b></u> | Returns the natural logarithm of the gamma function for a supplied value <i>(New in Excel 2010)</i>                                                                    |
| <u><b>GAUSS</b></u>           | Calculates the probability that a member of a standard normal population will fall between the mean and z standard deviations from the mean <i>(New in Excel 2013)</i> |
| <u><b>HYPGEOMDIST</b></u>     | Returns the hypergeometric distribution <i>(Replaced by Hypgeom.Dist function in Excel 2010)</i>                                                                       |
| <u><b>HYPGEOM.DIST</b></u>    | Returns the hypergeometric distribution <i>(New in Excel 2010 - replaces the Hypgeomdist function)</i>                                                                 |

|                     |                                                                                                                                                               |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>KURT</u>         | Returns the kurtosis of a data set                                                                                                                            |
| <u>LOGNORMDIST</u>  | Returns the cumulative log-normal distribution <i>(Replaced by Lognorm.Dist function in Excel 2010)</i>                                                       |
| <u>LOGNORM.DIST</u> | Returns the log-normal probability density function or the cumulative log- normal distribution <i>(New in Excel 2010 - replaces the Lognormdist function)</i> |
| <u>LOGINV</u>       | Returns the inverse of the lognormal distribution <i>(Replaced by Lognorm.Inv function in Excel 2010)</i>                                                     |
| <u>LOGNORM.INV</u>  | Returns the inverse of the lognormal distribution <i>(New in Excel 2010 - replaces the Loginv function)</i>                                                   |
| <u>NORMDIST</u>     | Returns the normal cumulative distribution <i>(Replaced by Norm.Dist function in Excel 2010)</i>                                                              |
| <u>NORM.DIST</u>    | Returns the normal cumulative distribution <i>(New in Excel 2010 - replaces the Normdist function)</i>                                                        |
| <u>NORMINV</u>      | Returns the inverse of the normal cumulative distribution <i>(Replaced by Norm.Inv function in Excel 2010)</i>                                                |
| <u>NORM.INV</u>     | Returns the inverse of the normal cumulative distribution <i>(New in Excel 2010 - replaces the Norminv function)</i>                                          |
| <u>NORMSDIST</u>    | Returns the standard normal cumulative distribution <i>(Replaced by Norm.S.Dist function in Excel 2010)</i>                                                   |
| <u>NORM.S.DIST</u>  | Returns the standard normal cumulative distribution <i>(New in Excel 2010 - replaces the Normsdist function)</i>                                              |
| <u>NORMSINV</u>     | Returns the inverse of the standard normal cumulative distribution <i>(Replaced by Norm.S.Inv function in Excel 2010)</i>                                     |
| <u>NORM.S.INV</u>   | Returns the inverse of the standard normal cumulative distribution <i>(New in Excel 2010 - replaces the Normsinv function)</i>                                |
| <u>PEARSON</u>      | Returns the Pearson product moment correlation coefficient                                                                                                    |
| <u>RSQ</u>          | Returns the square of the Pearson product moment correlation coefficient                                                                                      |
| <u>PHI</u>          | Returns the value of the density function for a standard normal distribution, for a supplied number <i>(New in Excel 2013)</i>                                |
| <u>POISSON</u>      | Returns the Poisson distribution <i>(Replaced by Poisson.Dist function in Excel 2010)</i>                                                                     |
| <u>POISSON.DIST</u> | Returns the Poisson distribution <i>(New in Excel 2010 - replaces the Poisson function)</i>                                                                   |
| <u>PROB</u>         | Returns the probability that values in a supplied range are within given limits                                                                               |

|                                     |                                                                                                                           |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>SKEW</u></a>         | Returns the skewness of a distribution                                                                                    |
| <a href="#"><u>SKEW.P</u></a>       | Returns the skewness of a distribution based on a population <i>(New in Excel 2013)</i>                                   |
| <a href="#"><u>STANDARDIZE</u></a>  | Returns a normalized value                                                                                                |
| <a href="#"><u>TDIST</u></a>        | Returns the Student's T-distribution <i>(Replaced by T.Dist.2t &amp; T.Dist.Rt functions in Excel 2010)</i>               |
| <a href="#"><u>T.DIST.2T</u></a>    | Returns the two-tailed Student's T-distribution <i>(New in Excel 2010 - replaces the Tdist function)</i>                  |
| <a href="#"><u>T.DIST.RT</u></a>    | Returns the right-tailed Student's T-distribution <i>(New in Excel 2010 - replaces the Tdist function)</i>                |
| <a href="#"><u>T.DIST</u></a>       | Returns the Student's T-distribution (probability density or cumulative distribution function) <i>(New in Excel 2010)</i> |
| <a href="#"><u>TINV</u></a>         | Returns the two-tailed inverse of the Student's T-distribution <i>(Replaced by T.Inv.2t function in Excel 2010)</i>       |
| <a href="#"><u>T.INV.2T</u></a>     | Returns the two-tailed inverse of the Student's T-distribution <i>(New in Excel 2010 - replaces the Tinv function)</i>    |
| <a href="#"><u>T.INV</u></a>        | Returns the left-tailed inverse of the Student's T-distribution <i>(New in Excel 2010)</i>                                |
| <a href="#"><u>TTEST</u></a>        | Returns the probability associated with a Student's T-Test <i>(Replaced by T.Test function in Excel 2010)</i>             |
| <a href="#"><u>T.TEST</u></a>       | Returns the probability associated with a Student's T-Test <i>(New in Excel 2010 - replaces the Ttest function)</i>       |
| <a href="#"><u>WEIBULL</u></a>      | Returns the Weibull distribution <i>(Replaced by Weibull.Dist function in Excel 2010)</i>                                 |
| <a href="#"><u>WEIBULL.DIST</u></a> | Returns the Weibull distribution <i>(New in Excel 2010 - replaces the Weibull function)</i>                               |
| <a href="#"><u>ZTEST</u></a>        | Returns the one-tailed probability value of a z-test <i>(Replaced by Z.Test function in Excel 2010)</i>                   |
| <a href="#"><u>Z.TEST</u></a>       | Returns the one-tailed probability value of a z-test <i>(New in Excel 2010 - replaces the Ztest function)</i>             |

Similarly, if we select the Math& Trig  
We get a list of possible Mathematical  
functions as follows:

#### Basic Numeric Information

|                             |                                                                     |
|-----------------------------|---------------------------------------------------------------------|
| <a href="#"><u>ABS</u></a>  | Returns the absolute value (i.e. the modulus) of a supplied number  |
| <a href="#"><u>SIGN</u></a> | Returns the sign (+1, -1 or 0) of a supplied number                 |
| <a href="#"><u>GCD</u></a>  | Returns the Greatest Common Divisor of two or more supplied numbers |
| <a href="#"><u>LCM</u></a>  | Returns the Least Common Multiple of two or more supplied numbers   |

#### Basic Mathematical Operations

|                                  |                                                                                                                                                                                     |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>SUM</u></a>       | Returns the sum of a supplied list of numbers                                                                                                                                       |
| <a href="#"><u>PRODUCT</u></a>   | Returns the product of a supplied list of numbers                                                                                                                                   |
| <a href="#"><u>POWER</u></a>     | Returns the result of a given number raised to a supplied power                                                                                                                     |
| <a href="#"><u>SQRT</u></a>      | Returns the positive square root of a given number                                                                                                                                  |
| <a href="#"><u>QUOTIENT</u></a>  | Returns the integer portion of a division between two supplied numbers                                                                                                              |
| <a href="#"><u>MOD</u></a>       | Returns the remainder from a division between two supplied numbers                                                                                                                  |
| <a href="#"><u>AGGREGATE</u></a> | Performs a specified calculation (e.g. the sum, product, average, etc.) for a list or database, with the option to ignore hidden rows and error values ( <i>New in Excel 2010</i> ) |
| <a href="#"><u>SUBTOTAL</u></a>  | Performs a specified calculation (e.g. the sum, product, average, etc.) for a supplied set of values                                                                                |

#### Rounding Functions

|                                        |                                                                                                                                    |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>CEILING</u></a>         | Rounds a number <u>away from zero</u> (i.e. rounds a positive number up and a negative number down), to a multiple of significance |
| <a href="#"><u>CEILING.PRECISE</u></a> | Rounds a number <u>up</u> , regardless of the sign of the number, to a multiple of significance ( <i>New in Excel 2010</i> )       |

|                                      |                                                                                                                                    |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>ISO.CEILING</u></a>   | Rounds a number <u>up</u> , regardless of the sign of the number, to a multiple of significance. <i>(New in Excel 2010)</i>        |
| <a href="#"><u>CEILING.MATH</u></a>  | Rounds a number up to the nearest integer or to the nearest multiple of significance <i>(New in Excel 2013)</i>                    |
| <a href="#"><u>EVEN</u></a>          | Rounds a number <u>away from zero</u> (i.e. rounds a positive number up and a negative number down), to the next even number       |
| <a href="#"><u>FLOOR</u></a>         | Rounds a number <u>towards zero</u> , (i.e. rounds a positive number down and a negative number up), to a multiple of significance |
| <a href="#"><u>FLOOR.PRECISE</u></a> | Rounds a number <u>down</u> , regardless of the sign of the number, to a multiple of significance <i>(New in Excel 2010)</i>       |
| <a href="#"><u>FLOOR.MATH</u></a>    | Rounds a number down, to the nearest integer or to the nearest multiple of significance <i>(New in Excel 2013)</i>                 |
| <a href="#"><u>INT</u></a>           | Rounds a number <u>down</u> to the next integer                                                                                    |
| <a href="#"><u>MROUND</u></a>        | Rounds a number <u>up or down</u> , to the nearest multiple of significance                                                        |
| <a href="#"><u>ODD</u></a>           | Rounds a number <u>away from zero</u> (i.e. rounds a positive number up and a negative number down), to the next odd number        |
| <a href="#"><u>ROUND</u></a>         | Rounds a number <u>up or down</u> , to a given number of digits                                                                    |
| <a href="#"><u>ROUNDDOWN</u></a>     | Rounds a number <u>towards zero</u> , (i.e. rounds a positive number down and a negative number up), to a given number of digits   |
| <a href="#"><u>ROUNDUP</u></a>       | Rounds a number <u>away from zero</u> (i.e. rounds a positive number up and a negative number down), to a given number of digits   |
| <a href="#"><u>TRUNC</u></a>         | Truncates a number <u>towards zero</u> (i.e. rounds a positive number down and a negative number up), to the next integer.         |

---

#### Matrix Functions

|                                 |                                                                              |
|---------------------------------|------------------------------------------------------------------------------|
| <a href="#"><u>MDETERM</u></a>  | Returns the matrix determinant of a supplied array                           |
| <a href="#"><u>MINVERSE</u></a> | Returns the matrix inverse of a supplied array                               |
| <a href="#"><u>MMULT</u></a>    | Returns the matrix product of two supplied arrays                            |
| <a href="#"><u>MUNIT</u></a>    | Returns the unit matrix for a specified dimension <i>(New in Excel 2013)</i> |

---

#### Random Numbers

|                             |                                         |
|-----------------------------|-----------------------------------------|
| <a href="#"><u>RAND</u></a> | Returns a random number between 0 and 1 |
|-----------------------------|-----------------------------------------|

**RANDBETWEEN** Returns a random number between two given integers

### Conditional Sums

**SUMIF** Adds the cells in a supplied range, that satisfy a given criteria

**SUMIFS** Adds the cells in a supplied range, that satisfy multiple criteria (*New in Excel 2007*)

### Advanced Mathematical Operations

**SUMPRODUCT** Returns the sum of the products of corresponding values in two or more supplied arrays

**SUMSQ** Returns the sum of the squares of a supplied list of numbers

**SUMX2MY2** Returns the sum of the difference of squares of corresponding values in two supplied arrays

**SUMX2PY2** Returns the sum of the sum of squares of corresponding values in two supplied arrays

**SUMXMY2** Returns the sum of squares of differences of corresponding values in two supplied arrays

**SERIESSUM** Returns the sum of a power series

### Trigonometry Functions

**PI** Returns the constant value of pi

**SQRTPI** Returns the square root of a supplied number multiplied by pi

**DEGREES** Converts Radians to Degrees

**RADIANS** Converts Degrees to Radians

**COS** Returns the Cosine of a given angle

**ACOS** Returns the Arccosine of a number

**COSH** Returns the hyperbolic cosine of a number

**ACOSH** Returns the inverse hyperbolic cosine of a number

**SEC** Returns the secant of an angle (*New in Excel 2013*)

**SECH** Returns the hyperbolic secant of an angle (*New in Excel 2013*)

**SIN** Returns the Sine of a given angle

**ASIN** Returns the Arcsine of a number

|                                    |                                                                                                                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>SINH</u></a>        | Returns the Hyperbolic Sine of a number                                                                         |
| <a href="#"><u>ASINH</u></a>       | Returns the Inverse Hyperbolic Sine of a number                                                                 |
| <a href="#"><u>CSC</u></a>         | Returns the cosecant of an angle <i>(New in Excel 2013)</i>                                                     |
| <a href="#"><u>CSCH</u></a>        | Returns the hyperbolic cosecant of an angle <i>(New in Excel 2013)</i>                                          |
| <a href="#"><u>TAN</u></a>         | Returns the Tangent of a given angle                                                                            |
| <a href="#"><u>ATAN</u></a>        | Returns the Arctangent of a given number                                                                        |
| <a href="#"><u>ATAN2</u></a>       | Returns the Arctangent of a given pair of x and y coordinates                                                   |
| <a href="#"><u>TANH</u></a>        | Returns the Hyperbolic Tangent of a given number                                                                |
| <a href="#"><u>ATANH</u></a>       | Returns the Inverse Hyperbolic Tangent of a given number                                                        |
| <a href="#"><u>COT</u></a>         | Returns the cotangent of an angle <i>(New in Excel 2013)</i>                                                    |
| <a href="#"><u>COTH</u></a>        | Returns the hyperbolic cotangent of an angle <i>(New in Excel 2013)</i>                                         |
| <a href="#"><u>ACOT</u></a>        | Returns the arccotangent of a number <i>(New in Excel 2013)</i>                                                 |
| <a href="#"><u>ACOTH</u></a>       | Returns the hyperbolic arccotangent of a number <i>(New in Excel 2013)</i>                                      |
| <b>Exponents &amp; Logarithms</b>  |                                                                                                                 |
| <a href="#"><u>EXP</u></a>         | Returns $e$ raised to a given power                                                                             |
| <a href="#"><u>LN</u></a>          | Returns the natural logarithm of a given number                                                                 |
| <a href="#"><u>LOG</u></a>         | Returns the logarithm of a given number, to a specified base                                                    |
| <a href="#"><u>LOG10</u></a>       | Returns the base 10 logarithm of a given number                                                                 |
| <b>Factorials</b>                  |                                                                                                                 |
| <a href="#"><u>FACT</u></a>        | Returns the Factorial of a given number                                                                         |
| <a href="#"><u>FACTDOUBLE</u></a>  | Returns the Double Factorial of a given number                                                                  |
| <a href="#"><u>MULTINOMIAL</u></a> | Returns the Multinomial of a given set of numbers                                                               |
| <b>Miscellaneous</b>               |                                                                                                                 |
| <a href="#"><u>BASE</u></a>        | Converts a number into a text representation, with the supplied base <i>(New in Excel 2013)</i>                 |
| <a href="#"><u>DECIMAL</u></a>     | Converts a text representation of a number in a specified base into a decimal number <i>(New in Excel 2013)</i> |
| <a href="#"><u>COMBIN</u></a>      | Returns the number of combinations (without repetitions) for a given number of objects                          |
| <a href="#"><u>COMBINA</u></a>     | Returns the number of combinations (with repetitions) for a given number of items <i>(New in Excel 2013)</i>    |
| <a href="#"><u>ARABIC</u></a>      | Converts a Roman numeral to an Arabic numeral <i>(New in Excel 2013)</i>                                        |

**ROMAN**

Returns a text string depicting the roman numeral for a given number

Also, if we select the Logical, we get a list of possible logical functions as follows:

| Function                                | Description                                                                                                                                                                         |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#"><u>AND function</u></a>     | Returns TRUE if all of its arguments are TRUE                                                                                                                                       |
| <a href="#"><u>FALSE function</u></a>   | Returns the logical value FALSE                                                                                                                                                     |
| <a href="#"><u>IF function</u></a>      | Specifies a logical test to perform                                                                                                                                                 |
| <a href="#"><u>IFERROR function</u></a> | Returns a value you specify if a formula evaluates to an error; otherwise, returns the result of the formula                                                                        |
| <a href="#"><u>IFNA function</u></a>    | Returns the value you specify if the expression resolves to #N/A, otherwise returns the result of the expression                                                                    |
| <a href="#"><u>IFS function</u></a>     | Checks whether one or more conditions are met and returns a value that corresponds to the first TRUE condition.                                                                     |
| <a href="#"><u>NOT function</u></a>     | Reverses the logic of its argument                                                                                                                                                  |
| <a href="#"><u>OR function</u></a>      | Returns TRUE if any argument is TRUE                                                                                                                                                |
| <a href="#"><u>SWITCH function</u></a>  | Evaluates an expression against a list of values and returns the result corresponding to the first matching value. If there is no match, an optional default value may be returned. |
| <a href="#"><u>TRUE function</u></a>    | Returns the logical value TRUE                                                                                                                                                      |
| <a href="#"><u>XOR function</u></a>     | Returns a logical exclusive OR of all arguments                                                                                                                                     |

# Examples

## 1- Math & Tri functions

| No | Function | syntax      | Description                                        | Examples                  |
|----|----------|-------------|----------------------------------------------------|---------------------------|
| 1  | ABS      | ABS(number) | Valuate the absolute value of a number             | Abs(6) = 6<br>Abs(-5) = 5 |
| 2  | Combin   | Combin(n;x) | Calculate the binomial coefficients $\binom{n}{x}$ | Combin(5;3)=10            |
| 3  |          |             |                                                    |                           |
| 4  |          |             |                                                    |                           |
| 5  |          |             |                                                    |                           |
| 6  |          |             |                                                    |                           |

## 2-Statistical functions

| No | Function | syntax                                            | Description                                                                                                   | Examples                             |
|----|----------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 1  | Average  | average(a1; a2; ... an)                           | Calculate the mean of a1, a2, ....an                                                                          | AVERAGE(1,8,9,2)=5                   |
| 2  | normdist | Normdist(x; mean; standard deviation; cumulative) | Calculate the cumulative probability function on normal distribution with given mean and standard derivation) | Normdist( 1.96; 0; 1; True) = 0.9750 |
| 3  | Norminv  |                                                   |                                                                                                               |                                      |
|    |          |                                                   |                                                                                                               |                                      |

## 3-Logical statements

| No | Function | syntax                                                     | Description                                                   | Examples                                                                                                                                                        |
|----|----------|------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | If       | If( logical test; statment1 if true; statement 2 if false) | If statement; do statement 1 if true, do statement 2 if false | Let x be a column of values 1, 2, 3. write the following statement in the first cell of the column y if(x2<=1; 1; 2). The output of the column y will be 1,2,3. |
| 2  |          |                                                            |                                                               |                                                                                                                                                                 |