

GUIDE TO MICROSOFT® EXCEL'S DATA ANALYSIS TOOLS

1. What Are the Data Analysis Tools? Excel includes a collection of 19 data analysis tools. These provide analysis capabilities beyond Excel's inherent capabilities. One of them provides *Fourier analysis* for engineering applications. The remaining 18 provide statistical analyses. A discussion of the differences between these 18 statistical analysis tools and Excel's 80 built-in statistical functions begins on the first page of guide to *Excel's Statistical Functions*.

2. Where Can I Find the Data Analysis Tools? The data analysis tools are available in the component called the Analysis ToolPak that is an **add-in** program. Add-in programs are developed by organizations other than Microsoft and can be added to Excel to increase its capabilities. Microsoft includes a number of add-ins, such as the Analysis ToolPak, with the Excel software it distributes. These must be *added in* to Excel before they can be used within it.

3. Are the Data Analysis Tools Available on the Computer I am Using? The level of availability of the data analysis tools depends on the specific computer you are using. There are three possibilities.

- a. The first possibility is that the Analysis ToolPak **(1) has been installed** and **(2) has been added** to the **Tools** pull-down menu. This means the data analysis tools are ready to use. To determine if this is your situation, click on **Tools** from the menu bar. If there is an entry usually near the bottom of the subsequent pull-down menu labeled **Data Analysis...**, the tools are ready to use. If it is not present, continue to the next possibility.
- b. The second possibility is that the Analysis ToolPak **(1) has been installed** but **(2) has not been added** to the **Tools** menu. You must then add it to the menu. To determine if this is your situation and to add it to the menu, click on **Tools** from the menu bar. Then click on **Add-ins...** from the *Tools* pull-down menu. If the menu includes the selection **Analysis ToolPak** in the subsequent dialog box, you should click on the check box to its left to add a check mark to the box. (Note you are to add **Analysis ToolPak**, *not* **Analysis ToolPak-VBA**.) Next click on **OK** and the Analysis ToolPak will be added to the **Tools** menu and ready to use. If Analysis ToolPak is not an option on the add-ins dialog box, continue to the third possibility. Usually this will not be true if you are using *Excel 2000* but could be if you are using *Excel 97*.
- c. The third possibility is that the Analysis ToolPak **(1) has not been installed** and **(2) has not been added**. You must then first install it and second add it to the Tools menu. If this is your situation, you will need to exit from Excel and all other application programs and return to your computer's opening screen. Get your original diskettes or CD-ROM's for Microsoft Office (or just Excel) and run the Setup program for it. Put the first CD or first diskette for your Microsoft Office software in the appropriate drive.

(1) Click on the **Start** command button and click on **Run** from the subsequent menu.

(2) The Run dialog box will appear on the screen. Assuming your CD or diskette is in drive D enter **D:\SETUP** in the text box and click on **OK**. (You may next get a dialog box indicating the Shortcut Bar is running. If so, click on **OK**.)

(3) The next dialog box will be labeled the **Microsoft Office—Set Up**. Click on the **Add/Remove** command button.

(4) The next dialog box is labeled **Microsoft Office—Maintenance**. Click to put a check mark in the **Excel** checkbox and to highlight Excel. Click on the **Change Option** button.

(5) The next dialog box is labeled **Microsoft Office—Microsoft Excel**. Click on the **Add Ins** button. Click on **Change Option**.

(6) The next dialog box is labeled **Microsoft Office—Add-Ins**. Click to put a check mark in the **Analysis ToolPak** (not Analysis ToolPak—VBA) check box and to highlight Analysis ToolPak. Click on **OK**.

The installation program will now install the Analysis ToolPak. You can then start Excel. You will next need to add it to the Tools menu. Select **Tools**, then **Add-Ins** and put a check mark in the **Analysis ToolPak** check box and select **OK**. The Data Analysis Tools will now be available from the Tools pull-down menu.

4. How Do I Use the Data Analysis Tools? Once you have the Analysis ToolPak installed and it has been added to the **Tools** pull-down menu, you are ready to use these analysis tools. First click on **Tools** from the menu bar and then click on **Data Analysis** on the subsequent pull-down menu. The result will be the *Data Analysis* dialog box with a scrolling list of the 19 data analysis tools. You then click on the name of the tool you wish to use and click on **OK**. A dialog box will then appear which allows you to enter the input range, output options and any other options required for the tool you have selected. If you are uncertain of an entry for a tool's dialog box, first click on **Help** (this is the **Help** in the tool's dialog box, not the **Help** in the prior *Data Analysis* dialog box with the scrolling list of the 19 tools). Once the tool's dialog box is complete, click on **OK** and the output will appear.

5. For What Analyses Are the Data Analysis Tools Used? A presentation of the uses of the data analysis tools is perhaps most helpful if it is given by category of analysis. Accordingly, the following list of the 18 statistical tools is by the type of statistical analysis each supports. The six categories used are *Descriptive Statistics*, *Sampling*, *Hypothesis Testing*, *Analysis of Variance*, *Regression and Correlation*, and *Time Series Forecasting*. The order of presentation of the six categories is the order of a typical business statistics textbook. Within each category the tools are listed in the order they appear in this manual. The entry for each of the 18 statistical tools provides its name and its purpose. Further description of these is available through the Excel *help* facility. To access it, select **Tools** from the menu bar, **Data Analysis**

from the subsequent pull-down menu, select the tool you wish to use from the resulting scrolling list, click on **OK** and click on **Help** in the next dialog box.

DESCRIPTIVE STATISTICS

Histogram—determines and graphs individual and cumulative frequencies for a one variable data set.

Descriptive Statistics—generates a report of the values for 16 descriptive statistics such as the mean, median, mode, standard deviation, range, skewness and kurtosis for a one variable data set.

Rank and Percentile—produces a table of the ordinal and percentage rank of each value in a one variable data set.

HYPOTHESIS TESTING

t-Test: Two Sample Assuming Unequal Variances—performs a t-test on two independent samples to determine if the difference in the two population means is equal to a specified value (such as zero). This test is conducted under the condition that the two population variances are not known to be equal.

t-Test: Two Sample Assuming Equal Variances—performs a t-test on two independent samples to determine if the difference in the two population means is equal to a specified value (such as zero). This test is conducted under the condition that the two unknown population variances are known to be equal.

z-Test: Two Sample for Means—performs a z-test on two independent samples to determine if the difference in the two population means is equal to a specified value (such as zero). This test is conducted under the condition that the values of the two population variances are known, or the sample sizes are large so the normal distribution can be used to approximate the t distribution.

t-Test: Paired Two Sample for Means—performs a t-test on two paired (matched) samples to determine if the mean of the differences between the two population is equal to a specified values (such as zero).

F-Test: Two-Sample for Variances—performs an F-test on two independent samples to determine if two population variances equal.

REGRESSION AND CORRELATION

Covariance—creates a table of covariance values for all possible pairs of 2 or more independent variables.

Correlation—creates a table of correlation coefficients for all possible pairs of 2 or more independent variables.

Regression—performs a simple linear regression analysis or a multiple regression analysis with up to 16 independent variables.

TIME SERIES FORECASTING

Moving Average—projects a time series based on the moving averages smoothing method.

Exponential Smoothing—projects a time series based on the simple exponential smoothing method.