
EXCEL: BEYOND THE BASICS

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Excel: Beyond The Basics

Volume 3 in the series **Excel for Professionals**

Volume 1: Excel For Beginners

Volume 2: Charting in Excel

Volume 3: Excel-- Beyond The Basics

Volume 4: Managing & Tabulating Data in Excel

Volume 5: Statistical Analysis with Excel

Volume 6: Financial Analysis using Excel

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Publisher: VJ Books Inc, Canada

Author: Vijay Gupta

Thanks to Alexa at the Zebra Lounge in Washington DC

Could not have done this book without that Coffee

ABOUT THE AUTHOR

Vijay Gupta has taught statistic, econometrics, and finance to institutions in the US and abroad, specializing in teaching technical material to professionals.

He has organized and held training workshops in the Middle East, Africa, India, and the US. The clients include government agencies, financial regulatory bodies, non-profit and private sector companies.

A Georgetown University graduate with a Masters degree in economics, he has a vision of making the tools of econometrics and statistics easily accessible to professionals and graduate students. His books on SPSS and Regression Analysis have received rave reviews for making statistics and SPSS so easy and “non-mathematical.” The books are in use by over 150,000 users in more than 140 nations.

He is a member of the American Statistics Association and the Society for Risk Analysis.

In addition, he has assisted the World Bank and other organizations with econometric analysis, survey design, design of international investments, cost-benefit, and sensitivity analysis, development of risk management strategies, database development, information system design and implementation, and training and troubleshooting in several areas.

Vijay has worked on capital markets, labor policy design, oil research, trade, currency markets, and other topics.

VISION

Vijay has a vision for software tools for Office Productivity and Statistics. The current book is one of the first tools in stage one of his vision. We now list the stages in his vision.

Stage one: Books to <i>Teach</i> Existing Software

He is currently working on books on word-processing, and report production using Microsoft Word, and a booklet on Professional Presentations.

The writing of the books is the first stage envisaged by Vijay for improving efficiency and productivity across the world. This directly leads to the second stage of his vision for productivity improvement in offices worldwide.

Stage two: <i>Improving</i> on Existing Software

The next stage is the construction of software that will radically improve the usability of current Office software.

Vijay's first software is undergoing testing prior to its release in Jan 2003. The software — titled "Word Usability Enhancer" — will revolutionize the way users interact with Microsoft Word, providing users with a more intuitive interface, readily accessible tutorials, and numerous timesaving and annoyance-removing macros and utilities.

He plans to create a similar tool for Microsoft Excel, and, depending on resource constraints and demand, for PowerPoint, Star Office, etc.

Stage 3: <i>Construction</i> of the first “feedback-designed” Office and Statistics software

Vijay’s **eventual goal** is the construction of productivity software that will provide stiff competition to Microsoft Office. His hope is that the success of the software tools and the books will convince financiers to provide enough capital so that a successful software development and marketing endeavor can take a chunk of the **multi-billion dollar** Office Suite market.

Prior to the construction of the Office software, Vijay plans to construct the “Definitive” statistics software. Years of working on and teaching the current statistical software has made Vijay a master at picking out the weaknesses, limitations, annoyances, and, sometimes, pure inaccessibility of existing software. This **1.5 billion dollar** market needs a new visionary tool, one that is appealing and inviting to users, and not forbidding, as are several of the current software. Mr. Gupta wants to create integrated software that will encompass the features of SPSS, STATA, LIMDEP, EViews, STATISTICA, MINITAB, etc.

Other

He has plans for writing books on the “learning process.” The books will teach how to understand one’s approach to problem solving and learning and provide methods for learning new techniques for self-learning.

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Mapping of menu options with sections of the book and in the series of books

You may be looking for a section that pertains to a particular menu option in Excel. I now briefly lay out where to find (in the series) a discussion of a specific menu option of Excel.

Table 1: Mapping of the options in the “FILE” menu

<i>Menu Option</i>	<i>Section that discusses the option</i>
OPEN SAVE SAVE AS	<i>Volume 1: Excel For Beginners</i>
SAVE AS WEB PAGE	23.2
SAVE WORKSPACE	<i>Volume 1: Excel For Beginners</i>
SEARCH	<i>Volume 1: Excel For Beginners</i>
PAGE SETUP	<i>Volume 1: Excel For Beginners</i>
PRINT AREA	<i>Volume 1: Excel For Beginners</i>
PRINT PREVIEW	<i>Volume 1: Excel For Beginners</i>
PRINT	<i>Volume 1: Excel For Beginners</i>
PROPERTIES	<i>Volume 1: Excel For Beginners</i>

Table 2: Mapping of the options in the “EDIT” menu

<i>Menu Option</i>	<i>Section that discusses the option</i>
UNDO	<i>Volume 1: Excel For Beginners</i>
REDO	<i>Volume 1: Excel For Beginners</i>
CUT COPY PASTE	Various
OFFICE CLIPBOARD	<i>Volume 1: Excel For Beginners</i>
PASTE SPECIAL	chapter 12
FILL	<i>Volume 4: Managing & Tabulating Data in Excel</i>

<i>Menu Option</i>	<i>Section that discusses the option</i>
CLEAR	<i>Volume 1: Excel For Beginners</i>
DELETE SHEET	<i>Volume 1: Excel For Beginners</i>
MOVE OR COPY SHEET	<i>Volume 1: Excel For Beginners</i>
FIND	<i>Volume 1: Excel For Beginners</i>
REPLACE	<i>Volume 1: Excel For Beginners</i>
GO TO	chapter 24
LINKS	chapter 9
OBJECT	chapter 9

Table 3: Mapping of the options in the “VIEW” menu

<i>Menu Option</i>	<i>Section that discusses the option</i>
NORMAL	<i>Volume 1: Excel For Beginners</i>
PAGE BREAK PREVIEW	<i>Volume 1: Excel For Beginners</i>
TASK PANE	<i>Volume 1: Excel For Beginners</i>
TOOLBARS	chapter 1
FORMULA BAR	Leave it on (checked)
STATUS BAR	Leave it on (checked)
HEADER AND FOOTER	<i>Volume 1: Excel For Beginners</i>
COMMENTS	chapter 7
FULL SCREEN	<i>Volume 1: Excel For Beginners</i>
ZOOM	<i>Volume 1: Excel For Beginners</i>

Table 4: Mapping of the options in the “INSERT” menu

<i>Menu Option</i>	<i>Section that discusses the option</i>
CELLS	<i>Volume 1: Excel For Beginners</i>
ROWS	<i>Volume 1: Excel For Beginners</i>
COLUMNS	<i>Volume 1: Excel For Beginners</i>
WORKSHEETS	<i>Volume 1: Excel For Beginners</i>
CHARTS	<i>Volume 2: Charting in Excel</i>

<i>Menu Option</i>	<i>Section that discusses the option</i>
PAGE BREAK	<i>Volume 1: Excel For Beginners</i>
FUNCTION	chapter 10-chapter 13
FUNCTION/FINANCIAL	<i>Volume 6: Financial Analysis using Excel</i>
FUNCTION/STATISTICAL	<i>Volume 5: Statistical Analysis with Excel</i>
FUNCTION/LOGICAL	chapter 17, chapter 18
FUNCTION/TEXT	chapter 14
FUNCTION/INFORMATION	17.3
FUNCTION/LOOKUP	17.3
FUNCTION/MATH & TRIG	chapter 16
FUNCTION/ENGINEERING	chapter 16
FUNCTION/DATABASE	16.2
FUNCTION/DATE & TIME	chapter 15
NAME	11.8
COMMENT	chapter 7
PICTURE	<i>Volume 2: Charting in Excel</i>
DIAGRAM	<i>Volume 2: Charting in Excel</i>
OBJECT	chapter 9
HYPERLINK	chapter 8

Table 5: Mapping of the options inside the “FORMAT” menu

<i>Menu Option</i>	<i>Section that discusses the option</i>
CELLS	<i>Volume 1: Excel For Beginners</i>
ROW	<i>Volume 1: Excel For Beginners</i>
COLUMN	<i>Volume 1: Excel For Beginners</i>
SHEET	<i>Volume 1: Excel For Beginners</i>
AUTOFORMAT	<i>Volume 1: Excel For Beginners</i>
CONDITIONAL FORMATTING	<i>Volume 1: Excel For Beginners</i>
STYLE	<i>Volume 1: Excel For Beginners</i>

Table 6: Mapping of the options inside the “TOOLS” menu

<i>Menu Option</i>	<i>Section that discusses the option</i>
SPELLING	<i>Volume 1: Excel For Beginners</i>
ERROR CHECKING	19.5
SPEECH	<i>Volume 4: Managing & Tabulating Data in Excel</i>
SHARE WORKBOOK	chapter 4
TRACK CHANGES	chapter 5
PROTECTION	chapter 6
ONLINE COLLABORATION	4.3
GOAL SEEK	22.2
SCENARIOS	22.1
AUDITING	chapter 19
TOOLS ON THE WEB	The option will take you to a Microsoft site that provides access to resources for Excel
MACROS	In upcoming book on “Macros for Microsoft Office”
ADD-INS	chapter 21
AUTOCORRECT	<i>Volume 1: Excel For Beginners</i>
CUSTOMIZE	chapter 1
OPTIONS	<i>Volume 1: Excel For Beginners</i>

Table 7: Mapping of the options inside the “DATA” menu

<i>Menu Option</i>	<i>Section that discusses the option</i>
SORT	<i>Volume 4: Managing & Tabulating Data in Excel</i>
FILTER	<i>Volume 4: Managing & Tabulating Data in Excel</i>
FORM	<i>Volume 4: Managing & Tabulating Data in Excel</i>
SUBTOTALS	<i>Volume 4: Managing & Tabulating Data in Excel</i>
VALIDATION	<i>Volume 4: Managing & Tabulating Data in Excel</i>
TABLE	11.12
CONSOLIDATION	section 48.5

<i>Menu Option</i>	<i>Section that discusses the option</i>
GROUP AND OUTLINE	<i>Volume 1: Excel For Beginners</i>
PIVOT REPORT	<i>Volume 4: Managing & Tabulating Data in Excel</i>
EXTERNAL DATA	<i>Volume 4: Managing & Tabulating Data in Excel</i>

Table 8: Mapping of the options inside the “WINDOW“ menu

<i>Menu Option</i>	<i>Section that discusses the option</i>
HIDE	<i>Volume 1: Excel For Beginners</i>
SPLIT	<i>Volume 1: Excel For Beginners</i>
FREEZE PANES	<i>Volume 1: Excel For Beginners</i>

Table 9: Mapping of the options inside the “HELP“ menu

<i>Menu Option</i>	<i>Section that discusses the option</i>
OFFICE ASSISTANT	<i>Volume 1: Excel For Beginners</i>
HELP	<i>Volume 1: Excel For Beginners</i>
WHAT’S THIS	<i>Volume 1: Excel For Beginners</i>

INTRODUCTION

Are there not enough Excel books in the market? I have asked myself this question and concluded that there are books “inside me,” based on what I have realized from observation by friends, students, and colleagues that I have a “vision and knack for explaining technical material in plain English.”

Read the book practicing the lessons on the sample files provided in the zipped file you downloaded. I hope the book is useful and assists you in increasing your productivity in Excel usage. You may be pleasantly surprised at some of the features shown here. They will enable you to save time.

The “Make me a Guru” series teach technical material in simple English. A lot of thinking went into the sequencing of chapters and sections. The book is broken down into logical “functional” components. Chapters are organized into sections and sub-sections. This creates a smooth flowing structure, enabling “total immersion” learning. The current book is broken down into a multi-level hierarchy:

- Chapters, each teaching a specific skill/tool.
- Several sections within each chapter. Each section shows aspect of the skill/tool taught in the chapter. Each section is numbered—for example, “Section 1.2” is the numbering for the second section in chapter 1.
- A few sub-sections (and maybe one further segmentation) within each section. Each sub-section lists a specific function, task, or proviso related to the “master” section. The sub-sections are numbered—for example, “1.2.a” for the first sub-section in the second section of chapter 1.

Unlike other publishers, I do not consider you dummies or idiots. Each and everyone had the God given potential to achieve mastery in any field. All one needs is a guide to show you the way to master a field. I hope to play this role. I am confident that you will consider your self an Excel “Guru” (in terms of the typical use of Excel in your profession) and so will others.

Once you learn the way to master a windows application, this new approach will enable you to pick up new skills” on the fly.” Do not argue for your limitations. You have none.

I hope you have a great experience in learning with this book. I would love feedback. Please use the feedback form on our website vjbooks.net. In addition, look for updates and sign up for an infrequent newsletter at the site.

FUNCTIONS

I teach the writing of formulas and associated topics. I show, in a step-by-step exposition, the proper way for writing cell references in a formula. The book describe tricks for copying/cutting and pasting in several examples. In addition, I discuss special pasting options.

Finally, different types of functions are classified under logical categories and discussed within the optimal category. The categories include financial, Statistical, Text, Information, Logical, and “Smart” Logical.

BASICS

The fundamental operations in Excel are taught in *Volume 1: Excel For Beginners*, and *Volume 2: Charting in Excel*.

FINANCE

In three chapters on financial functions, I list the functions used for estimating loan repayments (for example, like a car loan or house mortgage), discount cash flow analysis (used often for estimating the returns and present values of multi-period investment projects), and parameters associated with securities market instruments like bonds and T-bills.

If your interest is Investment Banking or Feasibility Studies (Project Finance), you should learn Scenarios, the Solver utility, and Goal Seek. With Scenarios, you can perform basic risk analysis.

STATISTICS PROCEDURES

Three chapters teach statistics functions including the use of Excel functions for building Confidence Intervals and conducting Hypothesis Testing for several types of distributions. The design of hypothesis tests and the intermediate step of demarcating critical regions are taught lucidly.

MANAGING & TABULATING DATA

Excel has extremely powerful data entry, data management, and tabulation tools. The combination of tools provide almost database like power to Excel. Unfortunately, the poor quality of the menu layout and the help preclude the possibility of the user self-learning these features. These features are taught in *Volume 4: Managing & Tabulating Data in Excel*

CHARTING

Please refer to book two in this series. The book title is *Charting in Excel*.

Sample data

All the sample data files are included in the zipped file.

I have not included the data set for conducting statistical procedures. This is intentional; often, readers fail to internalize the few key concepts of hypothesis testing because they do not subject themselves to a “sink-or-swim” inference-drawing thinking and imbibing process when interpreting the results of statistical procedures.

Sample data

Most of the tutorials use publicly available data from the International Labor Organization (ILO). I used a simple data set with only a few columns and observations. All the sample data files are included in the zipped file.

The samples for functions use several small data sets that are more suited to illustrating the power and usefulness of the functions.

CHAPTER 1

CUSTOMIZING THE “BUTTONS” OR “ICONS” IN THE TOOLBAR

This chapter teaches the following topics:

- WHAT IS A TOOLBAR?
- CHOOSING A COLLECTION OF ICONS THAT PERFORM
SIMILAR FUNCTIONS (FOR EXAMPLE, FORMATTING)
- UNDERSTANDING “DYNAMIC” TOOLBARS
- DYNAMIC TOOLBARS THAT OPEN AUTOMATICALLY IN THE
CORRECT CONTEXT

1.1

WHAT IS A TOOLBAR?

The entire set of icons that are visible is called the “Toolbar.” (A typical toolbar is shown in Figure 1). You can customize the toolbar so that the icons you need to use often are displayed and the ones you do not need are removed.

Figure 1: The “standard” toolbar is shown at the top of the Excel window.



1.2

CHOOSING A COLLECTION OF ICONS THAT PERFORM SIMILAR FUNCTIONS

1.2.A

CHOOSING A TOOLBAR

Choose the menu option VIEW/TOOLBARS (see Figure 2). Choose the option “Customize.”

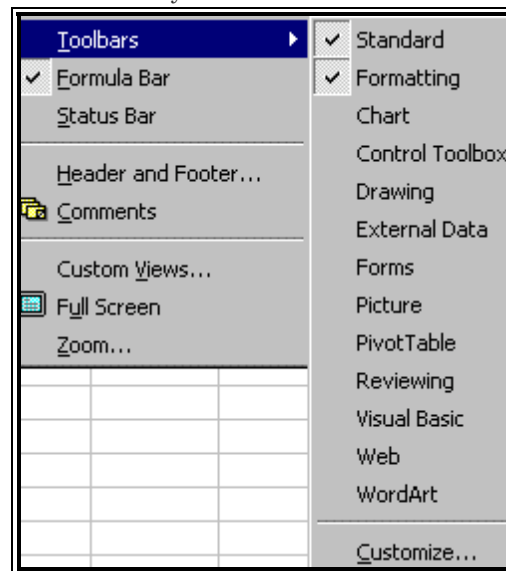
You will see a list of toolbars (see Figure 5). Each toolbar represents a collection of icons that perform similar tasks.

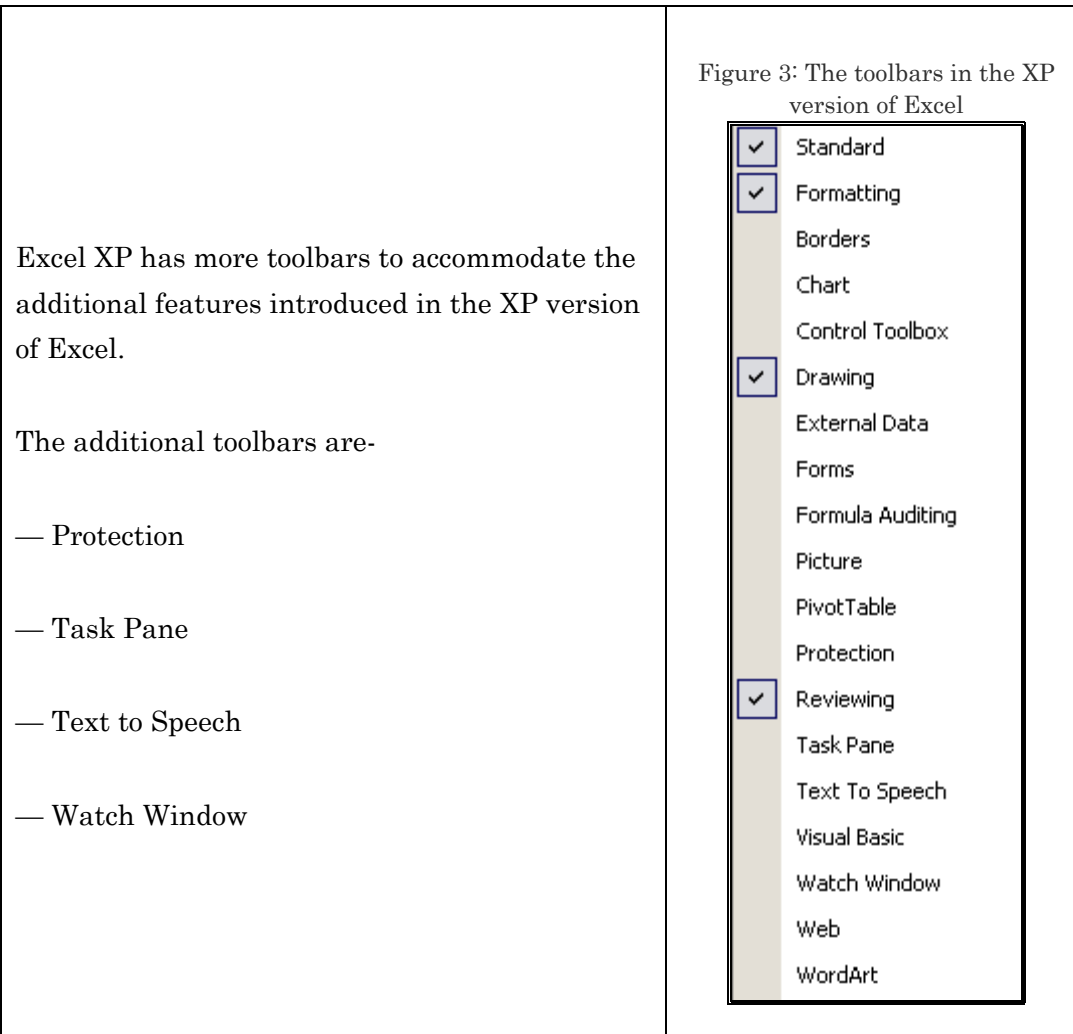
The check-marks next to “Standard” and “Formatting” imply that these have been chosen and are displayed at the top of the Excel application.

You can choose to add (or remove¹) other toolbars. If you choose a toolbar, then all the icons in it will be displayed at the top.

¹ The problem with displaying too many *toolbars* is that too much of the screen area is taken up by the icons in the toolbars.

Figure 2: Several toolbars are available. Selecting any toolbar will add a set of icons to the top of your Excel window.





The options tab is important in the last two versions of excel (including Excel XP).

In these versions of Excel, the toolbar does not show all the icons in the Standard and Formatting toolbars. Only a few icons are displayed.

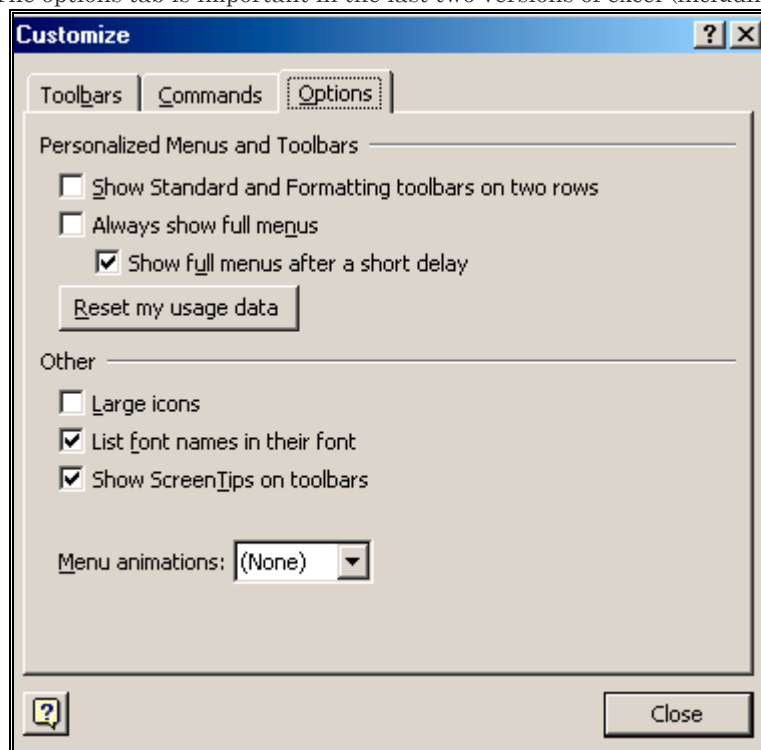
More icons can be assessed by clicking on the downward button at the end

of a toolbar. Once an icon is accessed, Excel “senses” that you may want to use the icon again and, therefore, it adds the icon to the set of icons displayed.

Viewing all the icons in a toolbar

Select the option “Show Standard and Formatting toolbars on two menus.”

Figure 4: The options tab is important in the last two versions of excel (including Excel XP)



Viewing all menu options

Similarly, the two latest versions of Excel do not show all the menu options when you click on a menu. Some options are only shown after you use them once. You can choose to see the complete menus by selecting

“Always show full menus.” Or, you can select “Show full menus after a short delay” if you prefer to first see partial menus and, after a gap in which Excel “senses” that you have not found the menu option you need, all the menu options are shown.

UNDERSTANDING “DYNAMIC” TOOLBARS

Luckily, in Excel, you do not usually need to choose any toolbars apart from “Standard” or “Formatting” because the toolbar display in Excel is dynamic. Excel ‘senses’ which toolbar you need for the current operation and automatically adds the relevant toolbars. For example, when you draw a chart, the “Chart” toolbar is often (but not always) automatically added to the screen (or it may be “floating” in the middle of the screen).

The other toolbars that are automatically displayed (or if not, then they should be chosen only when needed) when you take any action within their context are: “Control Toolbox²,” “External Data³,” “Forms,” “Picture,” “Pivot Report⁴,” “Reviewing⁵,” “Visual Basic,” and “Web.”

² The discussion of the following *toolbars* is beyond the scope of this book: “Control Toolbox,” “Forms,” “Picture,” “Visual Basic,” and “Web”.

³ Refer to volume 4: *Managing & Tabulating Data in Excel*.

⁴ Refer to volume 4: *Managing & Tabulating Data in Excel*.

⁵ See chapter 21.

1.4.A

THE ‘CUSTOMIZE’ OPTION

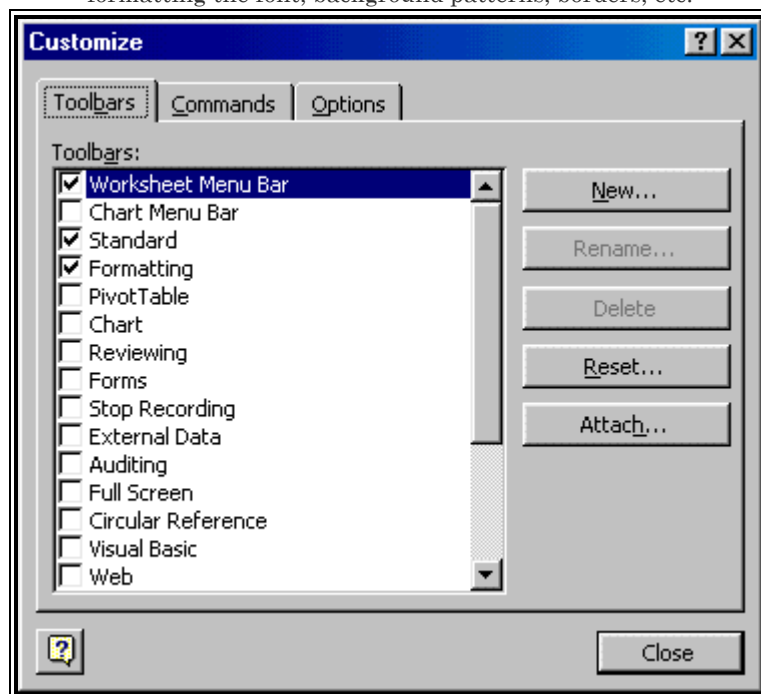
Click on the customize option under the VIEW/TOOLBARS menu shown in Figure 2. The dialog shown in the next figure opens.

You should select at least the three basic toolbars I have selected in Figure 5.

The other toolbars are dynamic — as explained earlier— and will “pop-up” if Excel senses that you are conducting work that would benefit from the presence of the particular toolbar.

The customize dialog shows more toolbars than the VIEW/TOOLBARS menu (compare the two figures above). Most of these toolbars are dynamic, “appearing” as and when needed.

Figure 5: Selecting Toolbars. Each Toolbar contains several icons that provide easy access to related functionality. For example, the toolbar “Formatting” contains icons that enable formatting the font, background patterns, borders, etc.



1.4.B

DYNAMIC TOOLBARS THAT OPEN AUTOMATICALLY IN THE CORRECT CONTEXT

Pivot

The dynamic “Pivot” toolbar opens automatically when you work on a Pivot Report. Refer to *Volume 4: Managing & Tabulating Data in Excel*.

External Data

The dynamic “External Data” toolbar opens automatically when you are working on a worksheet that is linked to data from an external source like a database. Refer to *Volume 4: Managing & Tabulating Data in Excel*.

“Reviewing” (or “Comments”)

The “Reviewing” toolbar opens automatically when you are inserting or reviewing comments. The toolbar is shown in 7.4.

Formula Auditing

The “Auditing” or “Formula Auditing” toolbar opens automatically when you are using the auditing option (TOOLS/AUDITING) to review formula references. The toolbar is shown in chapter 12.

Web

The “Web” toolbar opens automatically if Excel “senses” that you are

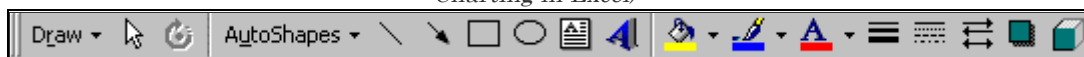
using hyperlinks or attempting to get on a location on the web or obtain data from the web. The toolbar is shown in chapter 8.

Chart, Drawing

Figure 6: The dynamic chart toolbar opens automatically (sometimes it does not open— just a glitch in the software) when you are working on a chart



Figure 7: The dynamic “Drawing (and INSERT/PICTURE)” toolbar opens automatically when you are working on any drawing object (more on these objects in volume two of this series- *Charting in Excel*)



Protection (only available in the XP version of Excel)

The “Protection” toolbar opens automatically if the current workbook or sheet is protected or if you are inserting protection. The toolbar is shown in chapter 6.

CHAPTER 2

PLACING/REMOVING INDIVIDUAL ICONS ON/FROM THE TOOLBAR

This chapter addresses the following topics:

- FINDING AND SELECTING AN ICON
- CHOOSING ICONS FOR SPECIFIC FUNCTIONS
- ADDING THE SELECTED ICON ONTO THE TOOLBAR
- REMOVING AN ICON FROM THE TOOLBAR

2.1

FINDING AND SELECTING AN ICON

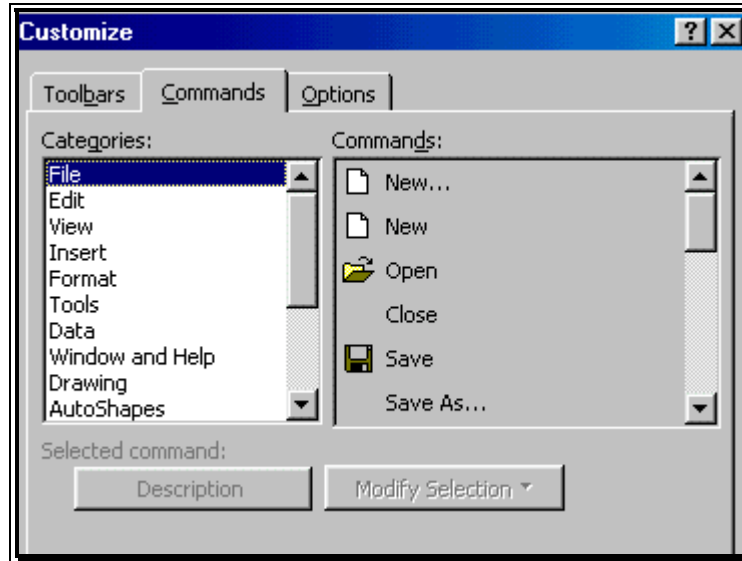
You may want to add/remove individual icons. Using the mouse, select the menu path VIEW/ TOOLBARS/ CUSTOMIZE (or to TOOLS/ CUSTOMIZE).

In order to access the individual icons within each category, open the relevant dialog by clicking on the tab “Commands.” (For a pictorial reproduction of this, see the next figure.)

If you click on a category on the left half of this dialog, the icons available under the category will be shown on the right half of the dialog. Scroll down the list on the right half. If your want to learn what process is

launched by a particular icon, click on the icons name and then on the button “Description” as shown in Figure 9.

Figure 8: Selecting an individual icon from the categories of toolbars



2.1.A

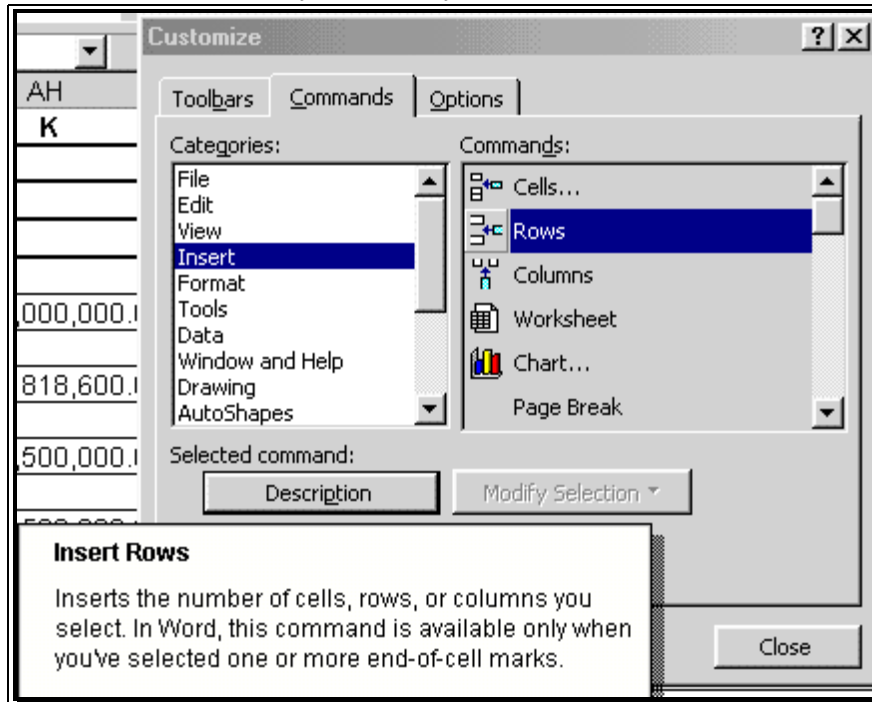
ADDING THE SELECTED ICON ONTO THE TOOLBAR

Click on the icon (in the right half of the dialog) and drag it to the top of the screen (where the other icons are).

In the next figure, I show how to select and add to the toolbar the icon for the command “Insert Rows” (within the left-half category “Insert”).

Spend some time looking through all the available icons— some of them may be real time savers. You should have quick access to procedures you use used often.

Figure 9: Choosing an icon and then placing it in the Excel toolbar area such that the icon is always and readily available for use



Time Saving Option:

Read *Volume 1: Excel For Beginners* to learn about the F4 key and the Format Painter. You will learn how to bypass the need for repetitively entering the same information into a dialog (F4 key) or one or more dialogs (the Format Painter).

Select the menu path VIEW/TOOLBARS/CUSTOMIZE. Drag the icon from the top of the screen into the area of the CUSTOMIZE dialog. This removes the icon from the toolbar.

Click on the button “Close” once you have finished adding/removing icon.

CHAPTER 3

DEFAULT OPTIONS

This chapter shows the following topics:

- THE BROAD SYSTEM OPTIONS
- ENSURING THAT THE USER IS PROMPTED TO PROVIDE SUMMARY INFORMATION FOR THE FILE.
- ENSURING THAT FILE/OPEN AND FILE/SAVE AS OPEN THE FOLDER YOU USE MOST OFTEN.
- CHOOSING THE NUMBER OF WORKSHEETS IN ANY NEW WORKBOOK
- SETTING THE WORKBOOK'S SUMMARY PROPERTIES
- DEFAULT SETTINGS FOR "CALCULATION"
- CUSTOMIZING WHAT ITEMS ARE SHOWN ON-SCREEN
- VIEWING THE FORMULAS IN THE CELLS OF A WORKSHEET
- DEFAULT SETTINGS FOR VIEWING COMMENTS
- CUSTOM LISTS
- AUTOCORRECT

3.1

SETTING THE DEFAULT OPTIONS

Learning how to set the default environment will:

-
- Enhance your knowledge of and insight into the basic structure of Excel
 - Make you feel in control
 - Permit the choice of icons in the toolbar⁶
 - Resolve some problems you may have had on files obtained from others or on certain computers. Alternatively, “Why does the new file have 16 empty worksheets and not only 6 like I prefer?”)
 - Enable the saving of time
 - Allow for better formatting
-

3.2

EDITING AND BASICS OF TYPING INTO CELLS

The most basic default settings are for simple editing. In its simplest form, editing involves simply typing data/text into a cell or pressing the ENTER key after working on a cell. Editing also includes cutting, copying, pasting, inserting, and dragging and dropping cells (that is, moving cells). I recommend sticking with the default options. These are reproduced in the next figure. Most of the options are self-explanatory.

Basic editing in a cell

If you want the cursor to the cell on the right after you press the ENTER key at the end of working on a cell, then select “Right” in the list box

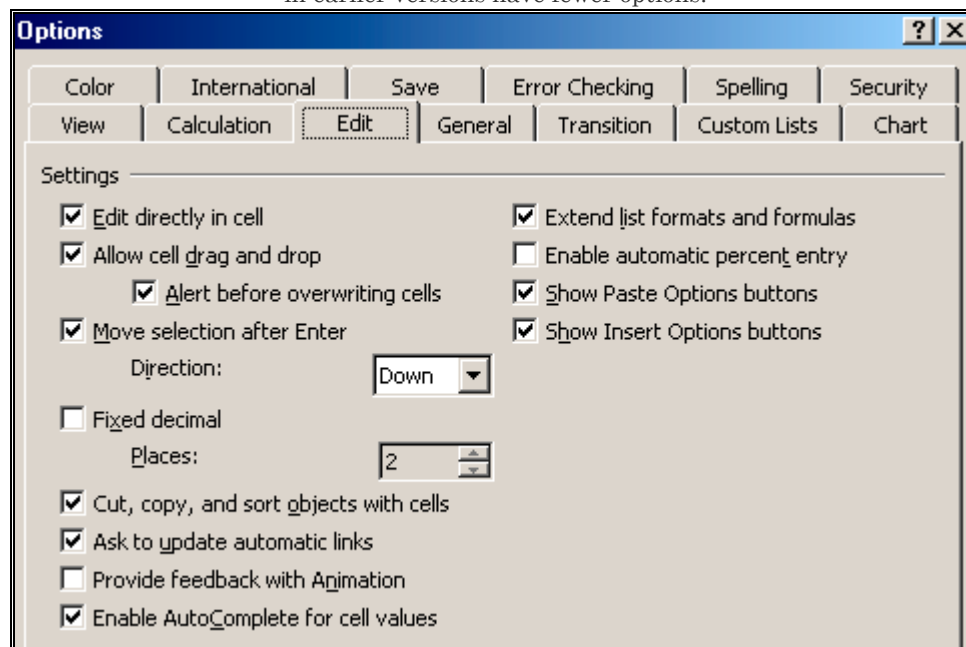
⁶ “Toolbar” refers to the set of *icons* you see at the top of the screen in any windows program. It is shown in Figure 259.

“Direction” below the option “Move selection after Enter.” The default decimals displayed for any new data entered into a cell can be set by selecting the option “Fixed decimal” and selecting the number of decimals in the box next to “Places.”

The option “Enable AutoComplete for cell values” activates the AutoComplete tool. Whenever you begin typing text into a cell, Excel may prompt you with optional “completed” strings. Just press the ENTER key to select the Excel suggestion. You can keep the AutoCompleted text or modify it.

In any case, you may save a lot of typing time and reduce the chances of typing errors. (In *Volume 4: Managing & Tabulating Data in Excel*, I discuss some tools that save typing time.)

Figure 10: The options for setting default editing options In Excel XP. The equivalent dialogs in earlier versions have fewer options.



Fill

The option “Extend list formats and formulas” facilitates the easy use of “Filling,” a technique taught in *Volume 4: Managing & Tabulating Data in Excel*.

Pasting and Inserting

Excel has several pasting and inserting options. You can choose to see these options on-screen after you have copied or cut a range. If you want to always see the options for pasting and inserting, select the options “Show Paste Options buttons,” and “Show Insert Options buttons,” respectively.

Objects

The insertion of objects is taught *Volume 3: Excel– Beyond The Basics*. Charts made on a worksheet are also objects. If you want the objects over a range of cells to move whenever the underlying cells are moved, then select “Cut, copy and sort objects with cells.”

Updating of links

Links are taught in *Volume 3: Excel– Beyond The Basics*. If you do not want to automatically update links, then select the option “Ask to update automatic links.”

THE BROAD SYSTEM OPTIONS

Access the feature through the menu path **TOOLS/OPTIONS**. The multi-tabbed dialog shown in Figure 11 opens. Each “tab” is itself a dialog and contains the options for setting the defaults for a specific topic — “View,” “Edit,” “Color,” etc. Click on the tab “General.”

Figure 11: The dialog in Excel 97

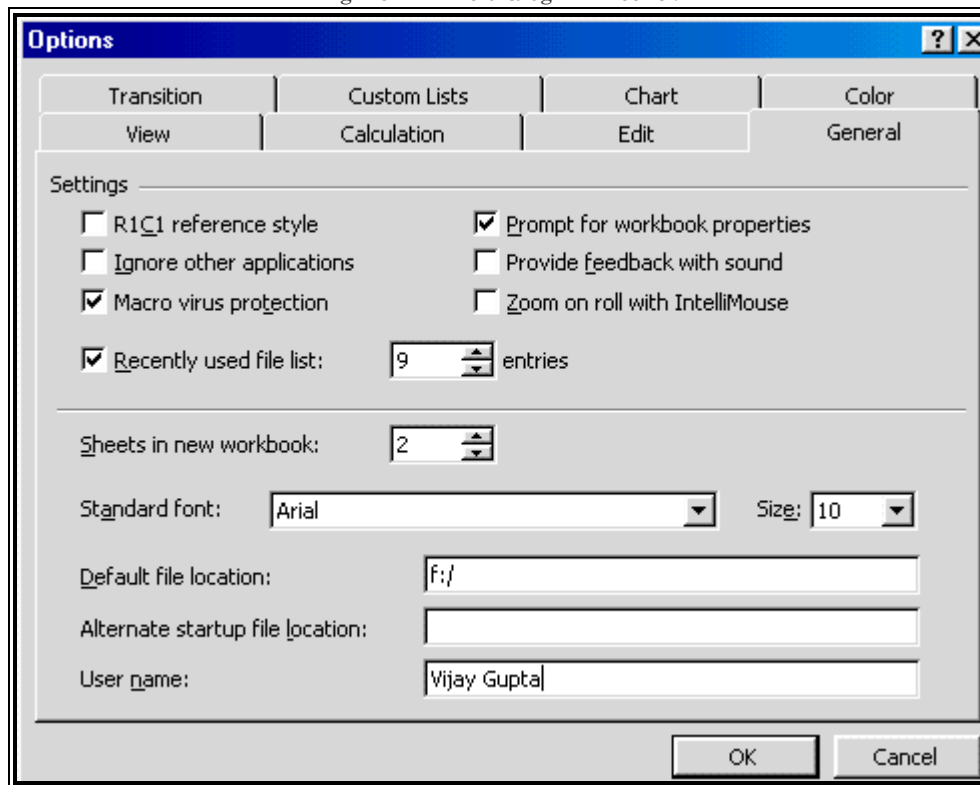
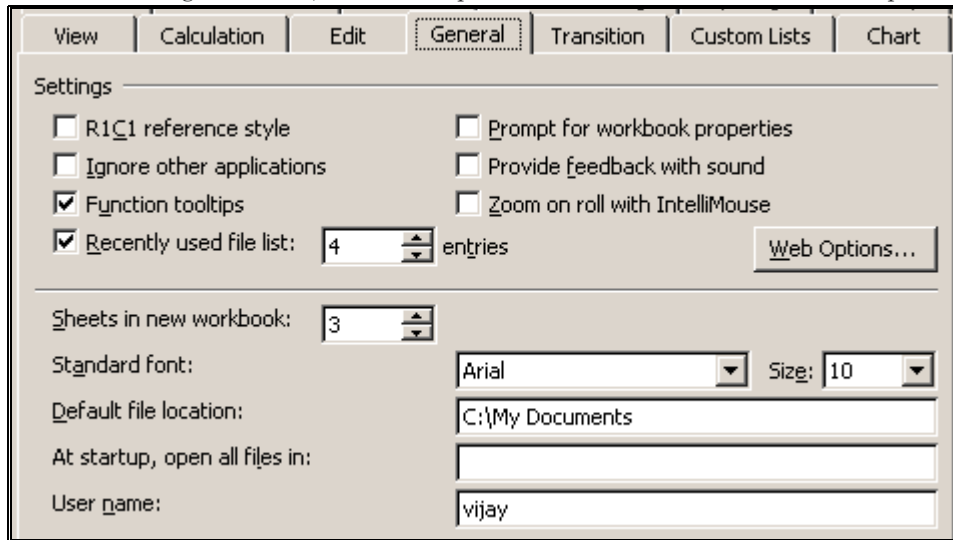


Figure 12: In Excel XP, the option “Macro virus protection” is now under a new tab “Security.” Two new options are added: the “Function tooltips” (which assist while writing functions or error-checking functions), and “Web Options” discussed a bit later in this chapter.



3.3.A ENSURING THAT EXCEL PROMPTS FOR SUMMARY INFORMATION

Choose the option “Prompt for workbook properties.” This forces you into the good practice of writing a small summary on the contents of the file. Enter your name in the box “User name.” This will place your name in the “workbook properties.” (For more on using workbook properties, see the next page.)

3.3.B ENSURING THAT OPEN AND SAVE OPEN THE MOST OFTEN USED FOLDER

In the box “Default file location,” enter the path you most often open files from or save files to” (like, for example, “f:\” or “m:\projects\consultant\gupta”). This is a great time saver— whenever you choose FILE/OPEN or FILE/SAVE AS you are taken to the path you use most often.

3.3.C CHOOSING THE NUMBER OF WORKSHEETS IN ANY NEW WORKBOOK

In the area “Worksheets in new workbook,” choose the number of worksheets you want in a new workbook. Typically, Excel has too many worksheets (16 is the Microsoft–set default) in a new workbook. You may prefer a smaller number⁷.

3.3.D RECENTLY OPENED FILES

In the FILE menu, the last few items are always the files you recently opened. The showing of this list permits easy access to these files. You can customize the number of files shown in this list by setting the number in the box next to the option “Recently used file list.”

I recommend choosing the other options as shown in Figure 11.

3.4 SETTING THE WORKBOOK’S SUMMARY PROPERTIES

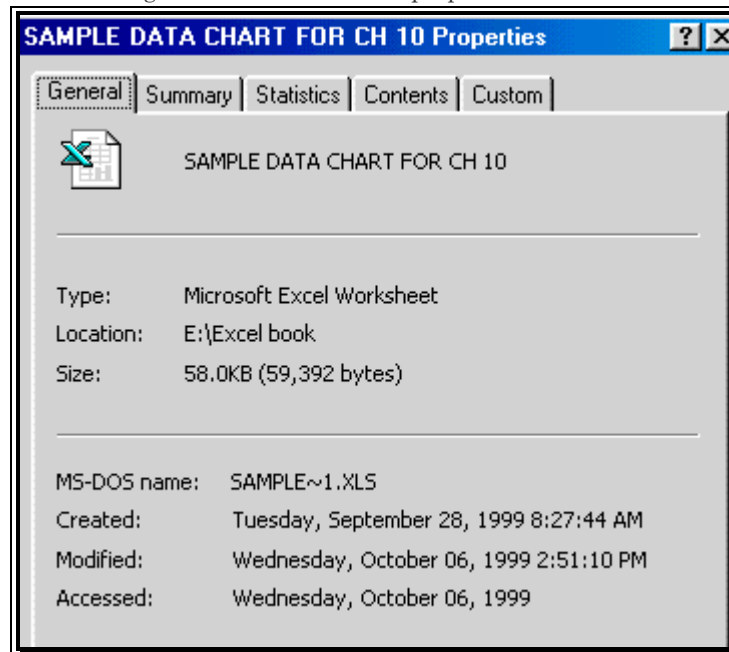
If you select the default option “Prompt for Summary Properties”⁸ (refer to

⁷ New worksheets can always be added later using the menu option INSERT / WORKSHEET.

⁸ For any single file, you can observe/write the properties by choosing the menu option FILE / PROPERTIES.

the previous figure and sub-section) then you will be prompted to enter the properties of the workbook any time a new workbook is saved. The “prompting” action is the opening of the dialog shown in Figure 13.

Figure 13: The “General” properties of the file



Click on the tab “Summary” and type in relevant information on the properties of the workbook. (I have done this for this particular workbook— see Figure 14.)

Figure 14: I recommend filling the text-boxes in the tab “Summary” as I have done for this file

The screenshot shows a dialog box titled "SAMPLE DATA CHART FOR CH 10 Properties" with a blue header bar. Below the header is a tabbed interface with five tabs: "General", "Summary", "Statistics", "Contents", and "Custom". The "Summary" tab is selected and highlighted. The "Summary" tab contains several text input fields with the following values:

- Title: Sample data for ch 10 of "Excel for Professionals"
- Subject: Making Charts in Excel
- Author: Vijay Gupta
- Manager: ,,
- Company: VJINC
- Category: Sample
- Keywords: Sample, data, charts, book
- Comments: Write comments here that pertain to the entire file. For comments on specific cells, use INSERT/COMMENTS
- Hyperlink base: (empty)

If you click on the tab “Statistics,” you will see some summary statistics about the workbook. (For a pictorial reproduction of this, see Figure 15.)

Figure 15: “Statistics” of the file

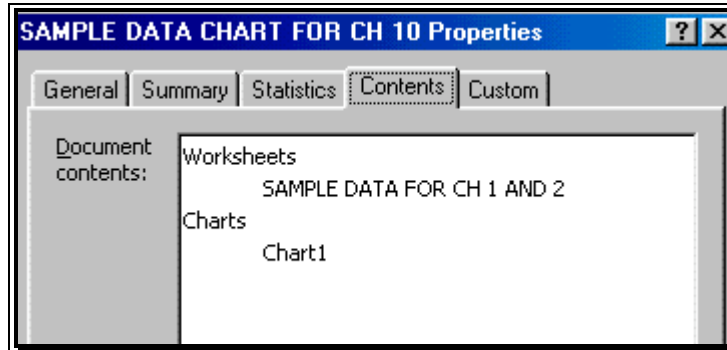
The screenshot shows the same dialog box as Figure 14, but with the "Statistics" tab selected and highlighted. The "Statistics" tab displays the following information:

- Created: Sunday, September 05, 1999 7:15:34 PM
- Modified: Wednesday, October 06, 1999 2:51:10 PM
- Accessed: Wednesday, October 06, 1999
- Printed: (empty)
- Last saved by: Vijay
- Revision number: (empty)
- Total editing time: (empty)

If you click on the tab “Contents,” you will see information on all the

worksheets, charts, and other objects in the workbook. (For a pictorial reproduction of this, see Figure 16.)

Figure 16: The top level objects in the file. Worksheets and Charts will be listed.

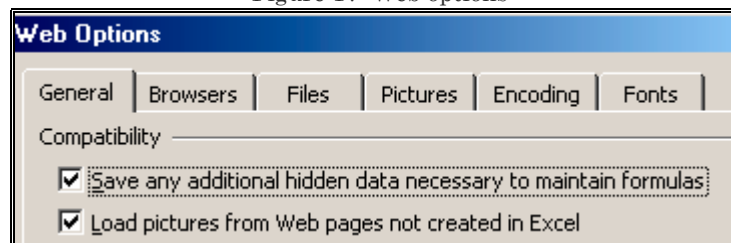


3.5

WEB (ONLY AVAILABLE IN THE XP VERSION OF EXCEL)

The web options are accessed through
TOOLS/OPTIONS/GENERAL/WEB OPTIONS.

Figure 17: Web options



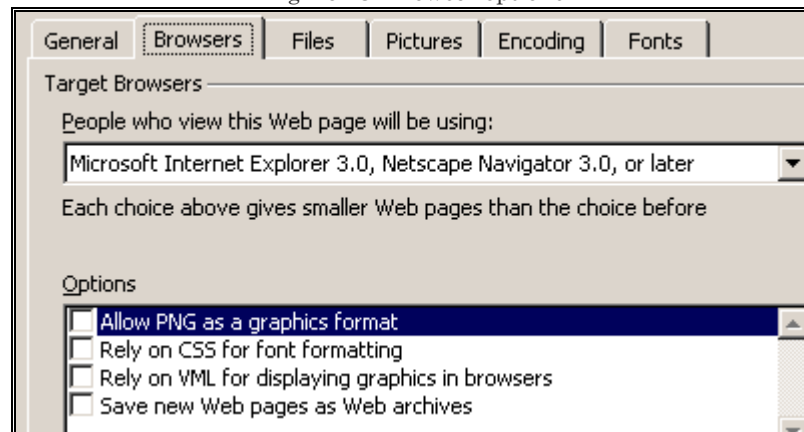
If the Excel file will be placed on the web (as an Excel or web file), you can optimize the file so that it is compatible with the browser you select. Most of the topics in this section may be incomprehensible if you do not work in web development

Furthermore, you can choose to save pictures within an Excel file in the new PNG format, and make Excel save a CSS style sheet for saving formatting features.

The new VML mode can be used for displaying graphics.

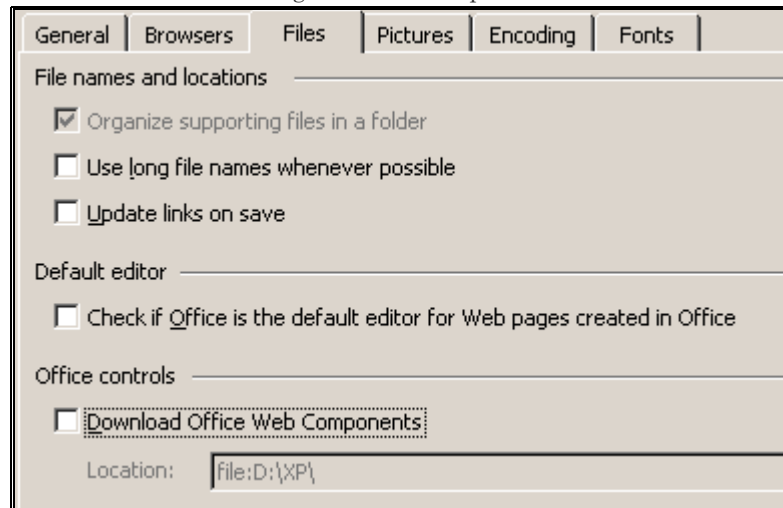
Saving as a web archive saves all aspects of the Excel file as one web archive file.

Figure 18: Browser options



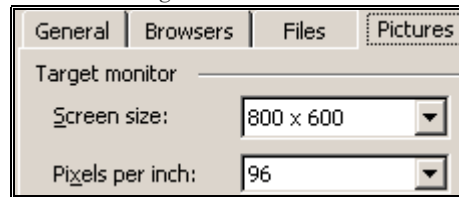
The options under the “files” tab are beyond the scope of this book.

Figure 19: Files options



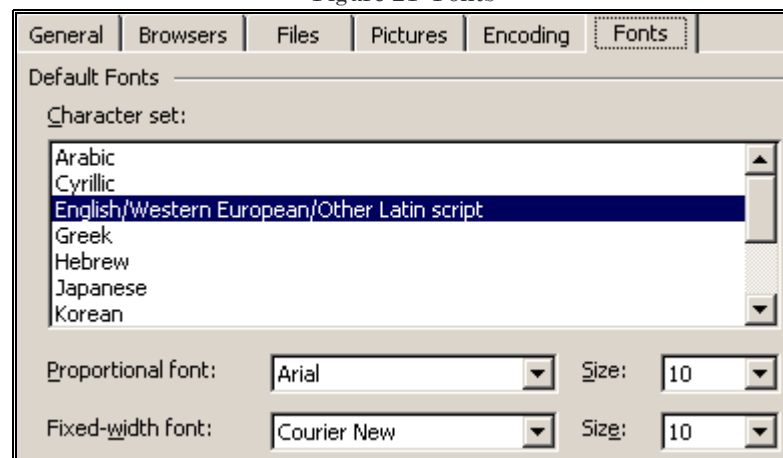
Select the resolution for which the web file should attempt optimality.

Figure 20: Pictures



Select the default fonts.

Figure 21: Fonts



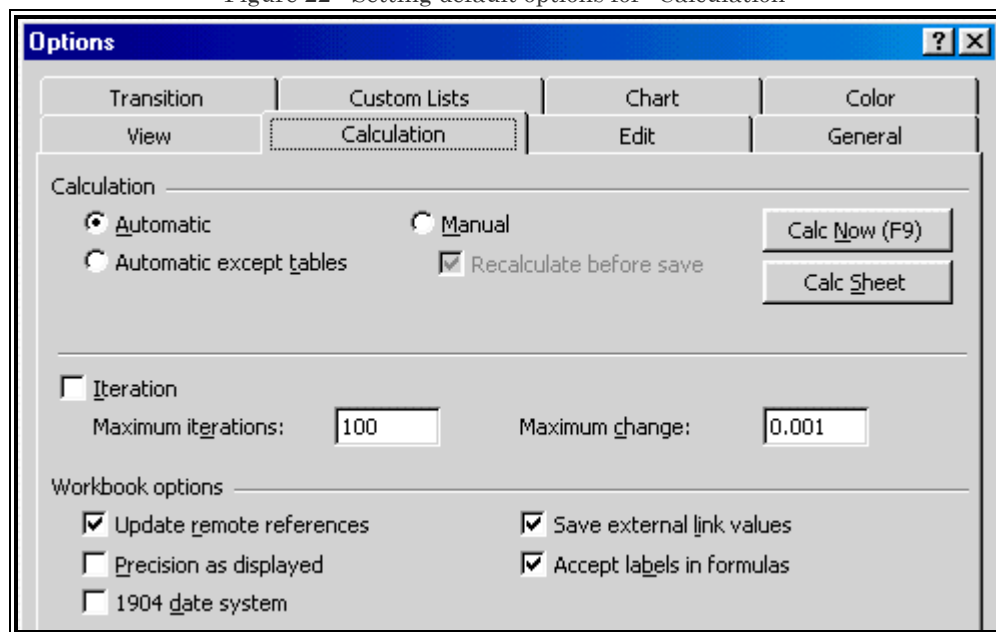
3.6

DEFAULT SETTINGS FOR “CALCULATION”

Return to TOOLS/OPTIONS—the same dialog as in Figure 11 on page 43. Let us set the default options for calculations—to access the relevant dialog click on the tab “Calculation.”

Choose the options as shown in Figure 22. Make sure the option “Automatic” is chosen in the area “Calculation”⁹.

Figure 22: Setting default options for “Calculation”



Under some circumstances, the setting “manual” is preferable. If you are working on a worksheet that has a lot of formulas (and specially if you are

⁹ If you are working on a workbook in which the numbers do not change even after you change the formula, then, most probably, the option “Manual” been chosen. Click on the button “Calculate Now” and choose the option “Automatic.”

entering data that will be used in the formulae) then automatic calculation will:

(a) slow down Excel's response, and

(b) come up with errors in formula cells whose reference cells have still not been filled.

In such a situation, choose the setting “manual.” When you want “manually” calculation:

(i) press the SHIFT key and then the F9 key to run the calculations for the worksheet you are working on.

(ii) press only on the F9 key to run calculations for all worksheets in the file.

3.7

CUSTOMIZING WHAT ITEMS ARE SHOWN ON— SCREEN

Let us set the default options for views— to access the relevant dialog click on the tab “View.” This tab has options that allow you to customize how worksheets look on screen and in some cases when printed (see Figure 23). The best way to learn how to use these options is to make changes and see the impact of each change.

In the area “Show,” select the options “Formula Bar” and “Status Bar.”

Figure 23: Choosing what you see on-screen

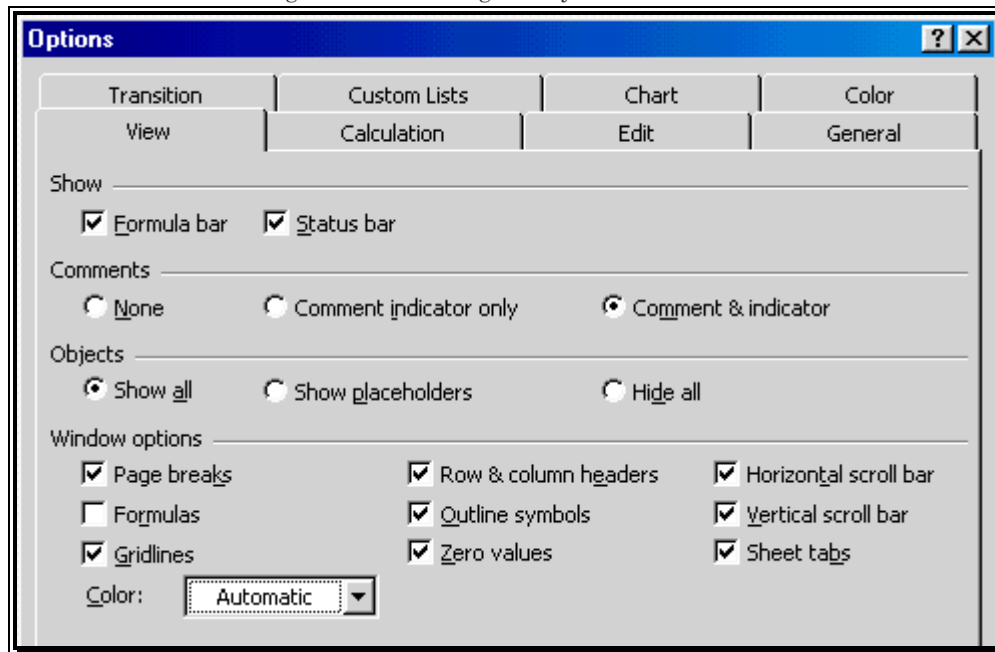
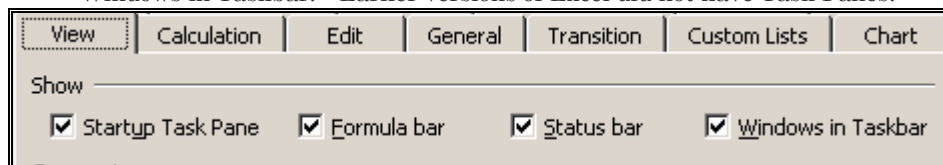


Figure 24: In Excel XP, you have the additional options for seeing the “Startup Task Pane” and “Windows in Taskbar.” Earlier versions of Excel did not have Task Panes.



For a worksheet with tables that will be placed into a report, I advise deselecting the option “Gridlines” in the area “Window options.” Without gridlines, you can format table borders much better by using `FORMAT/CELL/BORDERS` or `FORMAT/AUTOFORMAT`.

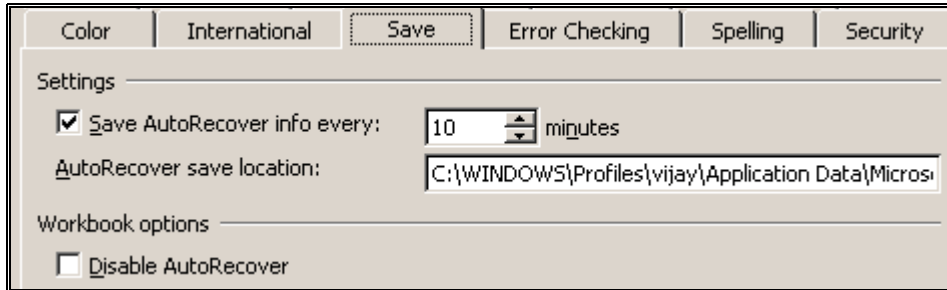
SAVING (ONLY AVAILABLE IN THE XP VERSION OF EXCEL)

In Excel XP, options related to saving files are placed within their own tab. (The options “Save AutoRecover info every,” and “AutoRecover save

location” were under the tabs “General” and “File Locations,” respectively, in earlier versions of Excel.)

The AutoRecover option is a new feature.

Figure 25: In Excel XP, options related to saving files are placed within their own tab



3.9

VIEWING THE FORMULAS IN THE CELLS OF A WORKSHEET

The option “Formulas” is useful if you want to see the formulas instead of the results. So, when you choose this option, a cell with the formula “=2*34” will show the formula “=2*34” instead of the result (“68”). This is useful when you want to read/check the formulas in the worksheet. I will show this to you on page 121.¹⁰

¹⁰ Try it out— write some formulas onto an Excel sheet and then choose to see the “Formulas”. See its usefulness?

3.10 **DEFAULT SETTINGS FOR VIEWING COMMENTS**

The options under the area “Comments” discussed in *Volume 3: Excel–Beyond The Basics*.

3.11 **CUSTOM LISTS**

The options under the tab “Custom Lists” are discussed in *Volume 3: Excel–Beyond The Basics*.

3.12 **AUTOCORRECT (ONLY AVAILABLE IN THE XP VERSION OF EXCEL)**

Microsoft has added a limited version of the “AutoCorrect” feature from Microsoft Word into Excel XP.

Pick the menu option **TOOLS/AUTOCORRECT OPTIONS**. The relevant dialog is shown in the next figure. You can choose to make Excel automatically correct (as you type):

- Two initial capitals (for example, “AMerica” will be corrected to “America”)
- Capitalize the first letter of each sentence
- Correct the accidental use of the Caps Lock key (for example, “AMERICA IS GREAT” will be corrected to “America is great” if Excel “senses” that the use of the Caps Lock key was accidental)

Excel will “Replace specific text strings as you type” if you choose the option “Replace text as you type.” The “incorrect” text and its auto-replacement text are defined in the list at the bottom of the dialog. In the next figure, see “incorrect-replacement” pairs like “abbout — about.”

Removing an AutoCorrected pair

If Excel is replacing text that you do not want auto-corrected, then find and remove the pair from the list in this dialog.

Excel has predefined pairs of commonly made spelling errors and inappropriate representation. (An example of the latter is the “(tm) - TM” pair in the previous figure.)

Figure 26: The AutoCorrect dialog

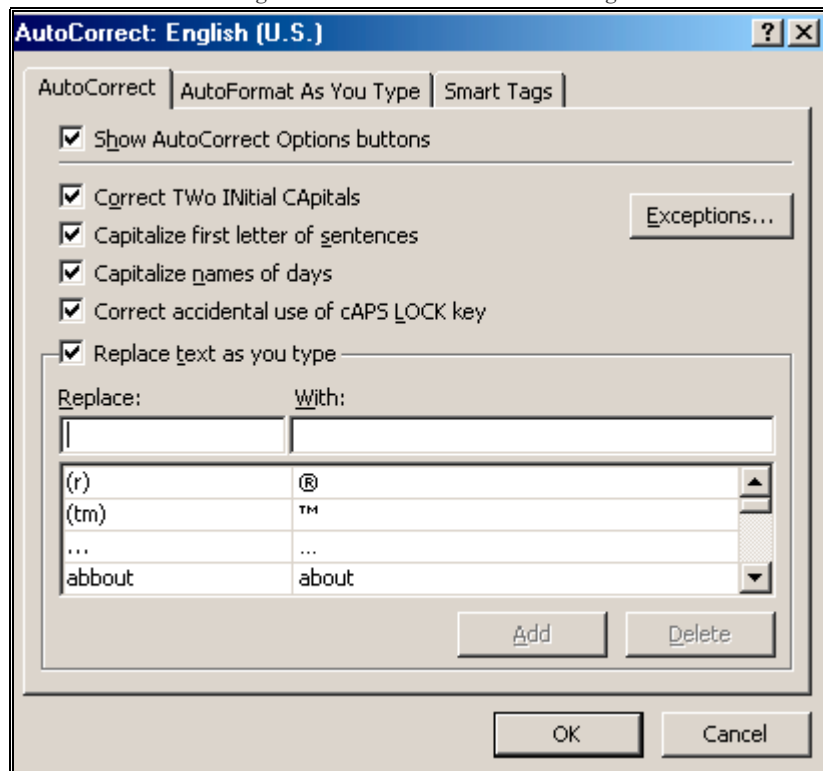
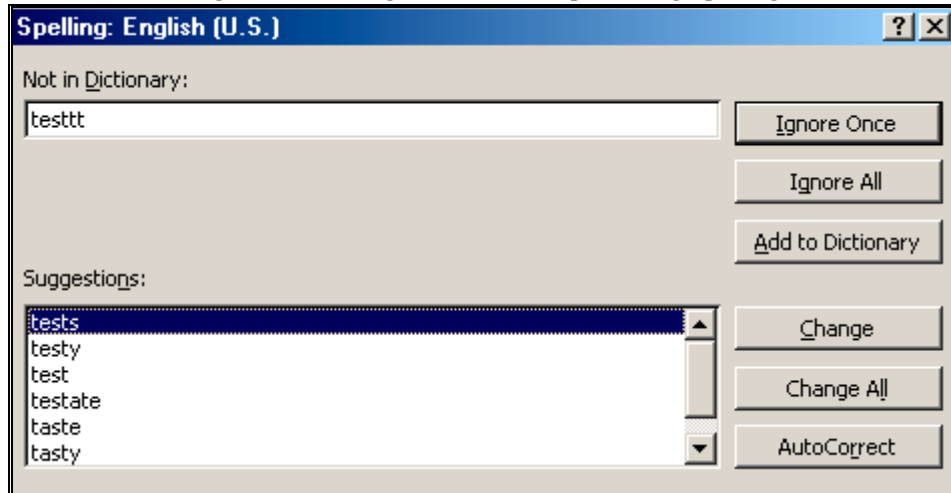


Figure 27: Adding an autocorrect pair using Spelling



You can add new pairs either by:

- (a) Typing the pair into the dialog, or,
- (b) Clicking on the “AutoCorrect” button while performing a spell check using TOOLS/SPELLING. The button is at the right-bottom of the spelling dialog as the next figure illustrates. In the example shown below, the pair that that will be added to AutoCorrect is “test — tests.”

Using AutoCorrect to save on typing time

AutoCorrect saves on time by reducing the chances of spelling errors. In addition, you can define pairs that AutoCorrect an abbreviation with the full form of the abbreviated text. For example, you can define a pair “USA-United States of America” so that you just have to type “USA” to

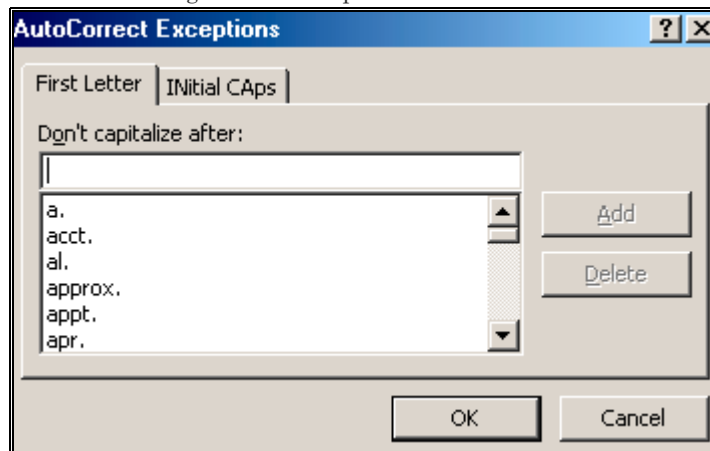
obtain the text “United States of America.”

Exceptions to AutoCorrect rules like “AutoCorrect two initial capitals” and “Capitalize the first letter of each sentence”

Some text strings end in a period even though the period is not supposed to signify the end of a sentence. For example, when using alphabetical numbering of points, the strings “a.” and “b.” end with periods but they are just being used as numberings for points. You may not want to capitalize after the period.

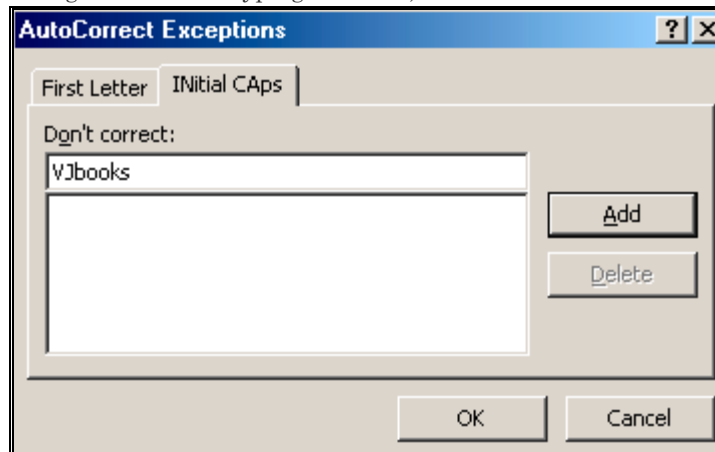
Other examples where periods do not signify the end of a sentence are shown in the next figure. (The dialog is accessed by clicking on the button “Exceptions” in the AutoCorrect dialog displayed two figures above.) You can add/remove strings from this list.

Figure 28: Exceptions to autocorrect



You can also direct Excel not to autocorrect two — or more — initial capitals in certain words. An example is shown in the next figure.

Figure 29: After typing the word, click on the button “Add”



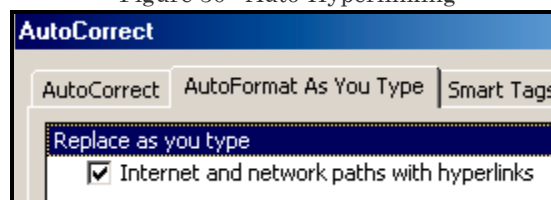
Auto-Hyperlinking

If you want to convert all web URLs and email addresses into hyperlinks to the URLs or emails, respectively, then select the option “Internet and network paths with hyperlinks” in the tab “AutoFormat as you type” in the AutoCorrect dialog.

If you want to convert all web URLs and email addresses into hyperlinks to the URLs or emails, respectively, then select the option “Internet and network paths with hyperlinks” in the tab “AutoFormat as you type” in the AutoCorrect dialog.

On the other hand, if you want to remove the automatic hyperlinking, then deselect this option.

Figure 30: Auto-Hyperlinking



3.13

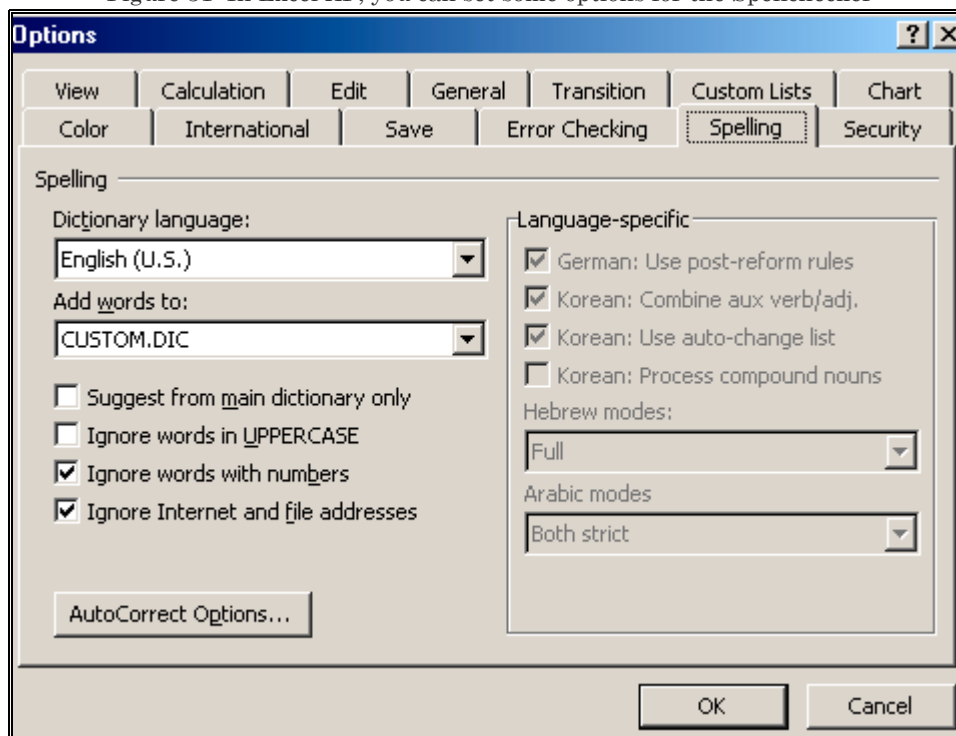
DEFAULT SETTINGS FOR SPELLINGS (ONLY AVAILABLE IN THE XP VERSION OF EXCEL)

The Spellchecker tool can be assessed through the menu option TOOLS/SPELLING.

A few spellchecking options can be set. I recommend sticking with the defaults.

Make changes or additions to AutoCorrect options using methods taught in the previous section.

Figure 31: In Excel XP, you can set some options for the Spellchecker



3.14

**DEFAULT SETTINGS FOR ERROR CHECKING (ONLY
AVAILABLE IN THE XP VERSION OF EXCEL)**

The options are listed in chapter 19.

CHAPTER 4

SHARING WORKBOOKS & ONLINE COLLABORATION

With reference to tools for group work on the same workbook, Excel XP is a major advance over earlier versions. A tool to track, highlight, and accept/reject editing changes, a feature long available in Word, has been added to Excel. This feature is taught in 5.2 starting below on this page.

Furthermore, security features like password protection for different levels of access to a file and its contents have been enhanced.

4.1

SHARING WORKBOOKS

The feature is accessible through the menu option **TOOLS/SHARE WORKBOOK**.

This feature allows more than one person editing the same workbook at the same time. You can view changes made by others working on the same workbook, record and store changes for up to 30 days, view the changes being made by others working on the same workbook, and set the options for saving changes.

Further discussion of this topic is beyond the scope of this book.

4.2

MERGING SCENARIOS

This topic is taught in 22.1.

4.3

ONLINE COLLABORATION

The feature is accessible through the menu option **TOOLS/ONLINE COLLABORATION**.

This feature allows direct use of Microsoft Web Conferencing technology while working on an Excel workbook. You need Microsoft Exchange Server or other compatible server technology. Ask your IT office to setup this feature and to teach you how to use the feature.

In Excel XP, you can save documents to Web sites on MSN.

CHAPTER 5

HIGHLIGHTING CHANGES SO THAT CHANGES MADE BY OTHERS CAN BE REVIEWED BEFORE FINAL INCLUSION

This chapter discusses the following topics:

- MAKING EXCEL HIGHLIGHT CHANGES
- REVIEWING CHANGES (AND ACCEPTING OR REJECTING THE CHANGES)
- LISTING TRACKED CHANGES ON A NEW WORKSHEET
- “IF THE SAME CELL HAS A HIGHLIGHTED CHANGE AND A COMMENT, HOW CAN I KNOW IT HAS BOTH? IN ADDITION, CAN I SEE THEM SEPARATELY?”

5.1

MAKING EXCEL HIGHLIGHT CHANGES

Before using the “Track Changes” tool, you have to define the settings for tracking changes for the workbook whose changes you want tracked. Select the option TOOLS/TRACK CHANGES/HIGHLIGHT CHANGES.

Figure 32: The “Track/Highlight Changes” menu option

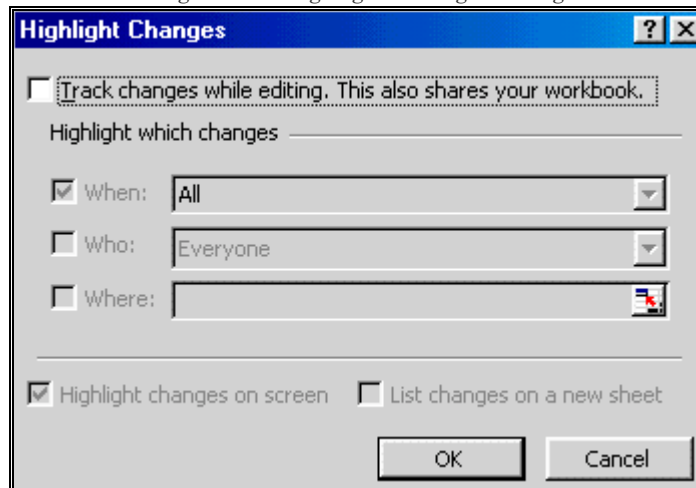


In the “Highlight Changes” dialog (shown in the next figure), you first have to choose whether to highlight (that is, track) changes in the active workbook.

Select the options “Track changes while editing....” and “Highlight Changes on screen.” (The next figure provides an illustration.)

Changes to the file will be tracked — ranges that are deleted, added to the worked-on range and modifications on existing filled cells will be highlighted with a distinct font style (color, underline, etc). The highlighting markers (that is, the font style representing each type of change) can be customized by going to the menu **TOOLS/OPTIONS/TRACK CHANGES**.

Figure 33: Highlight Changes dialog



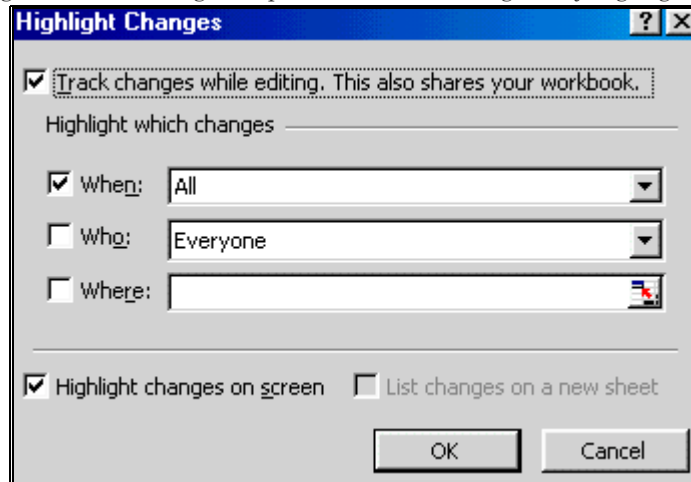
Once you choose to track changes, the lower half of the dialog shows some more options. These options permit customization of the track change process.

Go to the bottom of the dialog. Select the option “Highlight changes on

screen.”

The middle area of the dialog (see the area with the heading “Highlight which changes”) has three options to define which changes to track/highlight. The options are:

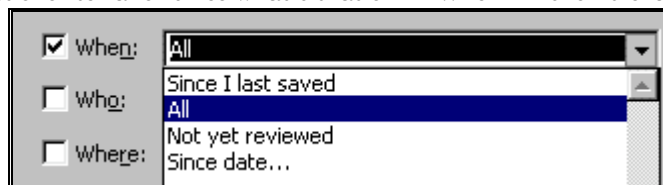
Figure 34: Choosing the option to “Track Changes” (by highlighting)



“When”: this provides options to define changes since what date/event should be tracked. The possible choices include the last time you last saved the file¹¹, the changes not yet reviewed, the changes since a particular date, or all changes. (The next figure provides an illustration)

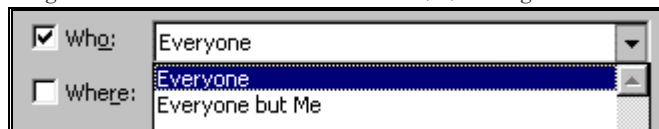
¹¹ Note that the workbook is tracking editing work by all users of the file. In this context “you” implies you can choose the focus only on changes you made. (Excel tracks users by PC. So if two people are sharing the same PC, it may not be able to distinguish between the two users.)

Figure 35: List of criteria for since what situation— “When” — should changes be tracked



“Who” (or, “Changes made by...”): if your interest is in tracking and reviewing (and then accepting or rejecting) changes made by others only, then choose the option “Everyone but me.” This may be of particular use in a situation where you have ultimate responsibility/authority for all changes to the workbook. (The next figure provides an illustration)

Figure 36: List of criteria for “Who”(se) changes to track.

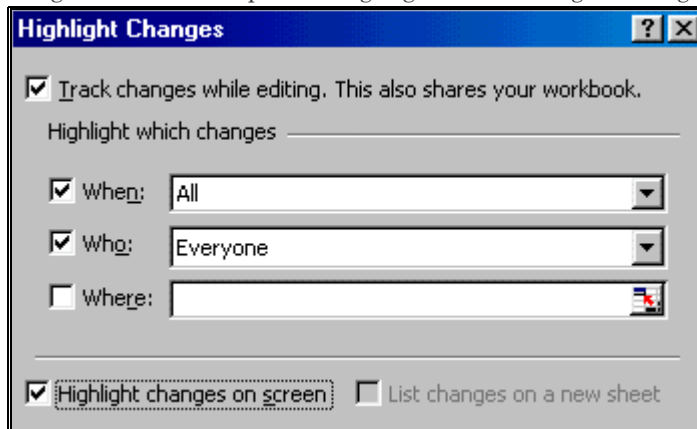


“Where”: ignore/deselect this option.

The next figure shows the dialog after setting the options for “When” and “Who(se)” in the area “Highlight which changes.”

Execute the dialog by clicking on the button OK.

Figure 37: The completed “Highlight/Track changes” dialog



You will notice that the title bar for the workbook now has the term “(shared)” shown at the end. (The title bar is at the top of your screen.) This is shown in the next figure.

Figure 38: If changes are being tracked, then the title bar of Excel will have the text “Shared” at the end



- Now, when editing is performed on the workbook or any changes are made to it, the changes will be highlighted and recorded. When you review the changes (the method is discussed in next section), you will have the option of accepting or rejecting a change.

REVIEWING CHANGES (AND ACCEPTING OR REJECTING THE CHANGES)

Assume you make three changes to the workbook.

- Delete the value in cell “E4.”
- Change the value in cell “C8” from 1,302,000.00 to 2,132.00.

- Write in a formula into the previously blank cell “F8.”

Excel highlights the changes. Each of the “changed” cells has an exaggerated border and an indicator on the left top corner of the cell. (This indicator looks like the indicator for a comment — as shown in 7.2 — but is in blue color while the comment indicator is in red color and the indicator is on a different corner of the cell relative to the position of the comment indicator. Later in this section, I show what happens when a cell has a tracked change and a comment.)

Figure 39: All the changes are marked by an indicator

3,195,000	3,521,000	3,776,000	
2,718,000	415,730,292		
2,366,000	2,699,000	3,488,000	
2,096,000	2,348,000	3,142,000	
1,562,000	2,075,000	2,666,000	
2,132	1,543,000	2,309,000	3,852,000
968,000	1,282,000	2,030,000	
674,000	946,000	1,494,000	

If you take the mouse over one of the changed and tracked cells, the change will be described in a text-box that opens. The text-box describes the changes made to the cell, along with information on “Who” and “When.”

Figure 40: A text-box opens if you place the mouse over the cell that has a “change” indicator.

Vijay Gupta, 7/27/2001 2:49 AM:
Changed cell F9 from '0' to '<blank>'.

Now you will want to review these changes and decide whether to accept them or reject them. (Rejecting a change would undo my action on that cell only.)

Method for reviewing changes

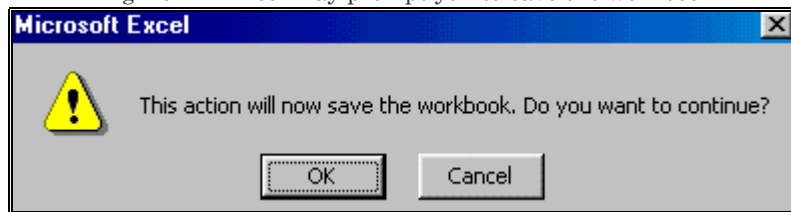
Follow the menu path TOOLS/TRACK CHANGES/ACCEPT OR REJECT CHANGES.

Figure 41: Reviewing the changes that have been tracked



If you see a prompt to save the workbook, please choose OK. (The prompt box is shown in the next figure.)

Figure 42: Excel may prompt you to save the workbook



The dialog for “Select Changes to Accept or Reject” opens.

Note You can select the type of changes (“When”) and the author of the changes (“Who”) at this stage.

Figure 43: Excel asks changes since when and by who should be reviewed

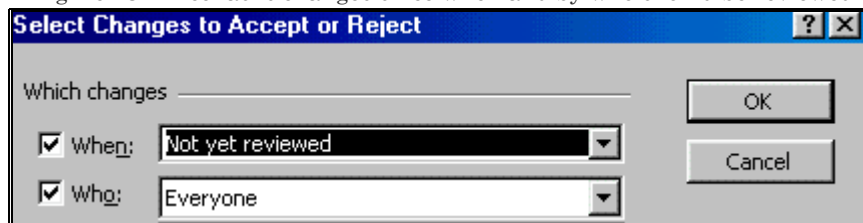


Figure 44: Options for “When”

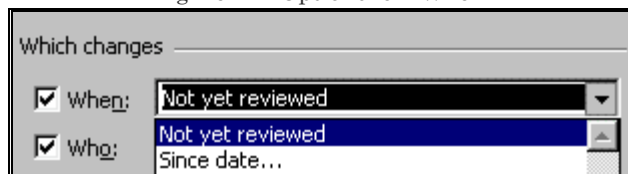


Figure 45: Options for “Who”

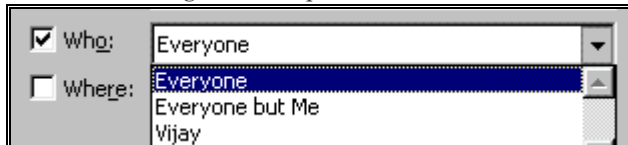
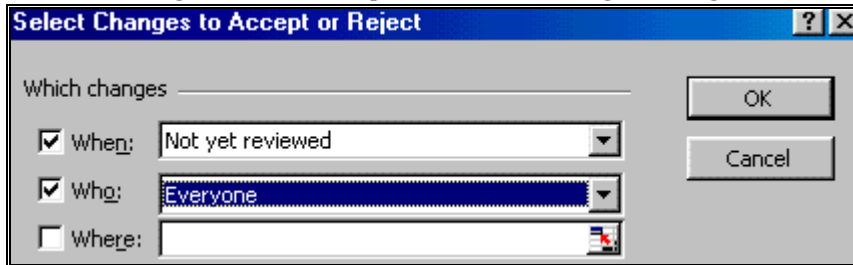
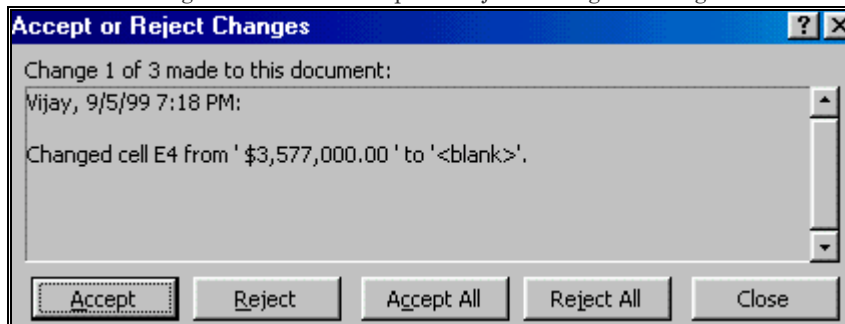


Figure 46: The completed “Review Changes” dialog



Execute the dialog by clicking on the button OK. The “Accept or Reject Changes” dialog opens. It is shown in the next figure.

Figure 47: The “Accept or Reject Changes” dialog



The dialog goes to each change that has been tracked and asks you if you would like to “Accept” or “Reject” (that is, Undo) the change. After you select, the dialog automatically moves to the next change and provides the

same options of accepting or rejecting changes.

Accepting or rejecting *all* changes

If you wish to accept all changes without reviewing them, then click on the button “Accept All.” If you wish to reject all changes without reviewing them, then click on the button “Reject All.”

Reviewing a change before deciding to accept or reject the change

Click on the button Accept or the button Reject for the change currently being displayed in the dialog. You will be taken to the next changed cell where again you select Accept or Reject and move down the list of changes.

5.3

LISTING TRACKED CHANGES ON A NEW WORKSHEET

After changes have been tracked, you can request Excel to create a new worksheet that lists all the changes that have been tracked.

The worksheet request is made by selecting the menu path TOOLS/HIGHLIGHT CHANGES and — in the “Highlight Changes” dialog that opens— selecting the option “List changes on a new sheet.” (The next figure provides an illustration.)

The list of changes

The worksheet that has the list of tracked changes is reproduced in the figure below.

Figure 48: Requesting Excel to “List tracked changes on a new sheet”

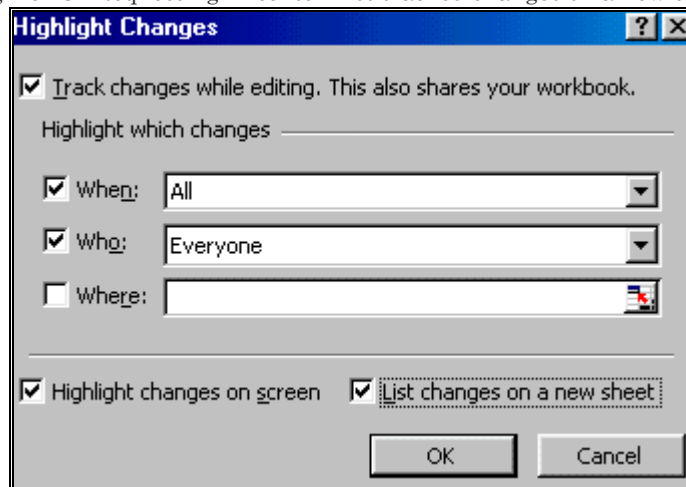


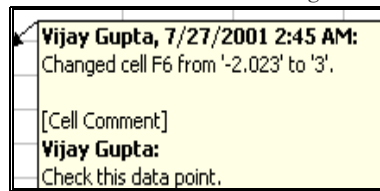
Figure 49: Excel creates a new worksheet that has a row for each change that has been tracked

	A	B	C	D	E	F	G	H	I
	Action Num	Date	Time	Who	Change	Sheet	Range	New Value	Old Value
2	1	9/5/99	7:18 PM	Vijay	Cell Change	SAMPLE DATA	E4	<blank>	\$3,577,000.00
3	2	9/5/99	7:18 PM	Vijay	Cell Change	SAMPLE DATA	C8	\$2,132.00	\$1,302,000.00
4	3	9/5/99	7:18 PM	Vijay	Cell Change	SAMPLE DATA	F8	=D8+E8	<blank>
5									
6	The history ends with the changes saved on 9/5/99 at 7:18 PM.								

“If The Same Cell Has A Highlighted Change And A Comment, How Can I Know It Has Both? In Addition, Can I See Them Separately?”

The comment box will show both — the change and the comment— as the next figure illustrates. The tracked change is on top of the comment box. The comment(s) follows — see the text after the line “[Cell Comment].”

Figure 50: A cell with a Tracked change and a Comment



CHAPTER 6

PASSWORD PROTECTION

The topics taught in this chapter are:

- PREVENTING UNAUTHORIZED ACCESS TO OR
MODIFICATION OF A FILE
- PROTECTING CONTENTS OR/AND GRAPHICAL ITEMS ON
ONE SHEET
- PROTECTING CELL VALUES AND FORMULAS
- PROTECTING THE STRUCTURE OF SHEETS

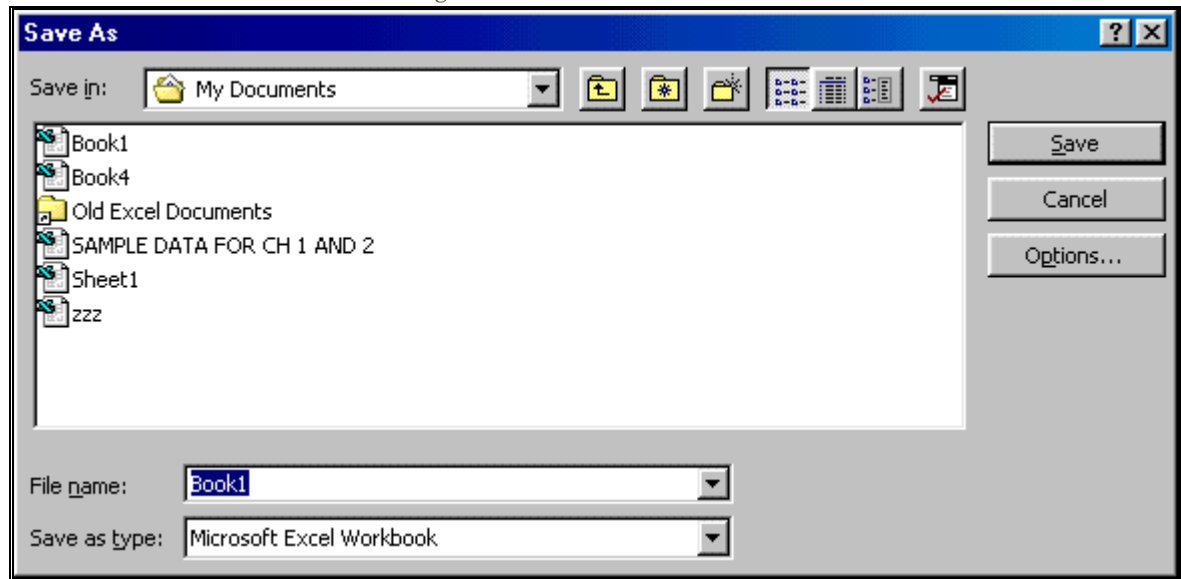
6.1

PREVENTING UNAUTHORIZED ACCESS TO OR MODIFICATION OF A FILE

In Excel 97: Using the mouse, select the menu path FILE/SAVE AS—
shown in the next figure for Excel 97.

If the file is being saved for the first time, then choose the path and name
of the file. Click on the button *Options*.

Figure 51: In Excel 97



In Excel XP: in the FILE/SAVE AS dialog, click on tools (at the upper right corner of the dialog) and choose the option “General options.”

The “Save Options” dialog opens.

Figure 52: “Read-only” protection



You will be prompted for two different passwords:

- (1)“Password to open.” Once you choose the password, the file will only open if the user has the correct password.

and,

2) “Password to modify (file).” Once you choose the password, the file opens without a password. However, the file can be modified only if the user has the correct password. Such files are also called “Read Only.”

Figure 53: Dialog for password protecting a file

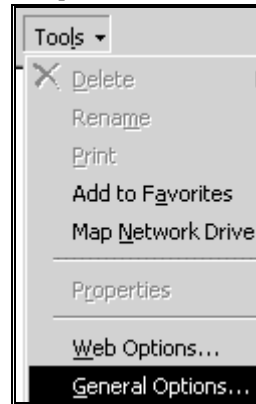


While the first password option limits the opening of the file to only those users who have the correct password to “open,” the second password will not stop anyone from opening the file but it limits modifications to the file to only those users who have the correct password to “modify.”

The second option is also called “Making the file Read-Only.” That is, anyone can read the file, but, if unauthorized, cannot write into — that is, modify — the file.

Note The passwords are case sensitive. Therefore, “Aasd” will not open the file if the password you set is “aasd.”

Figure 54: In Excel XP, the Save options can be chosen from within the Save dialog

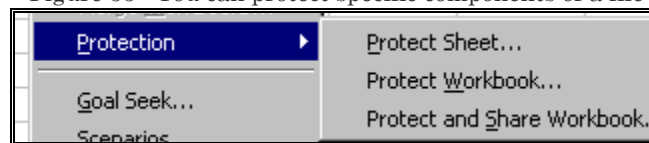


6.2

PROTECTING CONTENTS ON A WORKSHEET (PRE-XP VERSIONS OF EXCEL)

Click on the worksheet or chart you want to protect against undesired change by other readers of the file.

Figure 55: You can protect specific components of a file



Access the feature through the menu path **TOOLS/PROTECTION/PROTECT SHEET**. The dialog shown in the next figure opens. You can protect the worksheet or chart against three types/levels of change:

- The option “Contents” protects all contents in the cells of a worksheet or all items in a chart.
- The option “Objects” protects any graphical object on a worksheet (like charts, drawing objects, etc) and individual graphical items within a chart (each label, line, axis, data series, bar, etc).
- The third option (“Scenarios”) is discussed in 22.1.

After choosing the types of changes to protect against, type a password and click on the button OK.

Figure 56: The features that can be protected at the individual sheet level

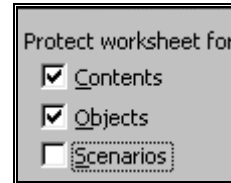
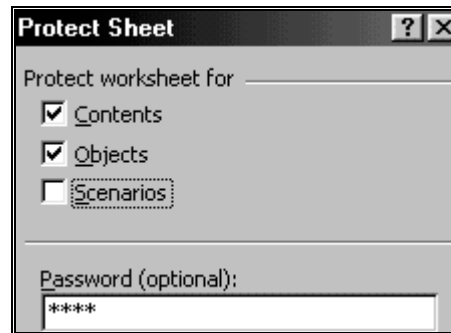


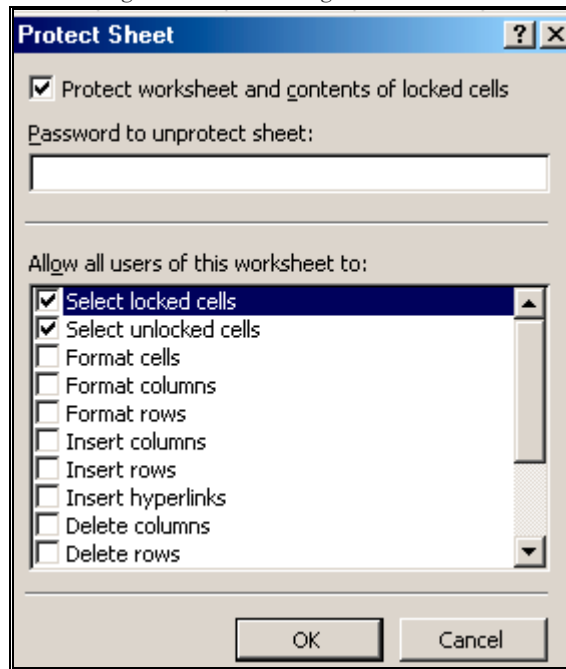
Figure 57: Protecting a sheet in Excel 97 and 2000



PROTECTING CONTENTS ON A WORKSHEET (FOR EXCEL XP)

Cell values and formulas can be protected from all or specific users. Go to TOOLS/PROTECTION/PROTECT SHEET. Choose specific protection features from the large list of options. The options are shown in the next dialog.

Figure 58: Protecting a Sheet in XP

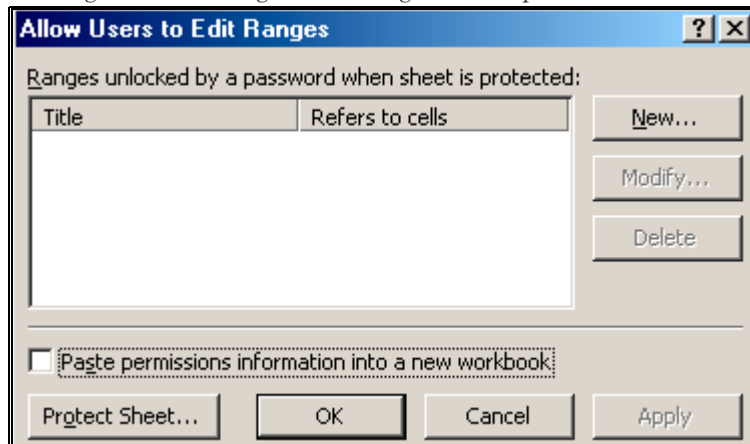


6.4

SETTING CERTAIN RANGES TO “NOT PROTECTED” STATUS (ONLY AVAILABLE IN THE XP VERSION OF EXCEL)

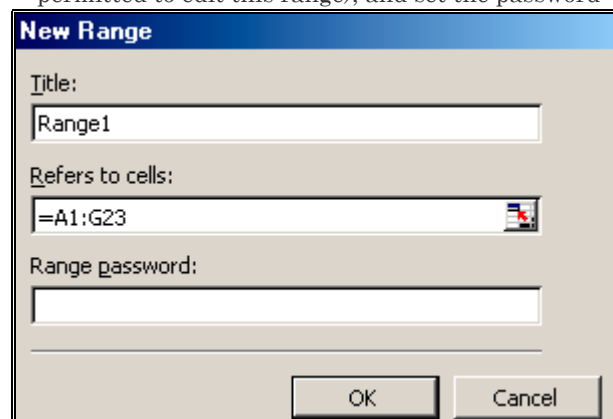
Go to TOOLS/PROTECTION/ALLOW USERS TO EDIT RANGES. The relevant dialog is shown in the next figure.

Figure 59: Setting certain ranges to “not protected” status



Click on “New.” Select the range on which you do not want the worksheet protection to be effective. (Worksheet protection was taught in the previous section.) A separate password can be set for each such range. (See the next figure).

Figure 60: While defining the range, use a logical title (for example, the name of the person permitted to edit this range), and set the password

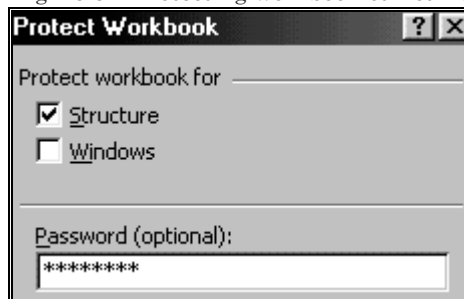


You may want to ensure that the sheets (worksheets and charts) in a workbook are not: deleted, moved, re-ordered, renamed, hidden,

unhidden, or new sheets are inserted. (While still allowing changes to the contents of existing cells, graphical objects, and items inside charts.)

For protecting the workbook's structure follow the menu path **TOOLS/ PROTECTION/ PROTECT WORKBOOK** and choose the option "Structure". The next figure illustrates this.

Figure 61: Protecting workbook structure

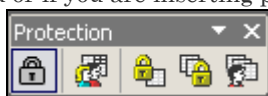


Enter a password and execute the dialog by clicking on the button OK.

6.6

THE PROTECTION TOOLBAR (ONLY AVAILABLE IN THE XP VERSION OF EXCEL)

Figure 62: The "Protection" toolbar opens automatically if the current workbook or sheet is protected or if you are inserting protection.

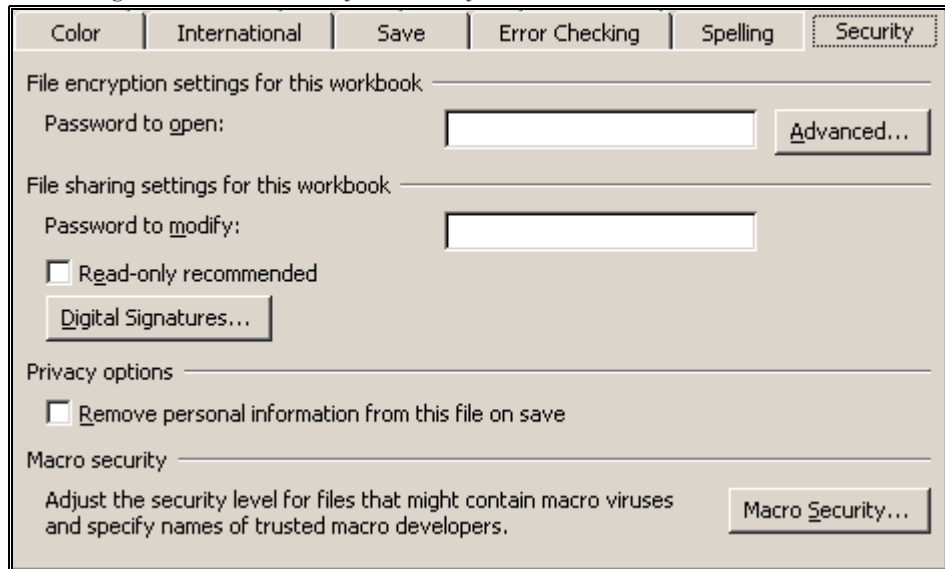


See chapter 2 starting on page 35 to learn how to add individual icons or a group of icons to the Excel toolbar.

SECURITY OPTIONS

The options for security are set using the dialog accessed through **TOOLS/OPTIONS/SECURITY**.

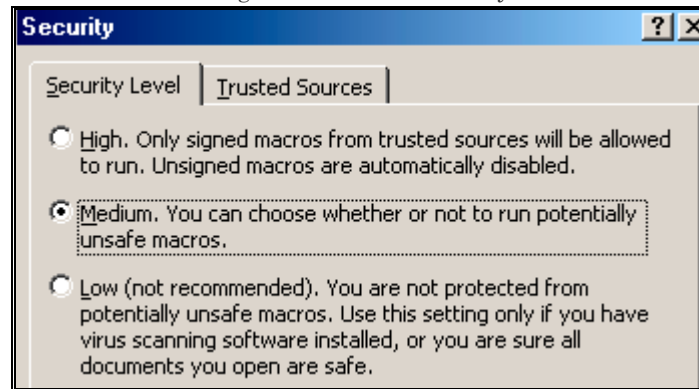
Figure 63: The Security tab is only available in the XP version of Excel



Macro Security

Click on the button “Macro Security.” Select the optimal level of security under the tab “Security Level.”

Figure 64: Macro Security

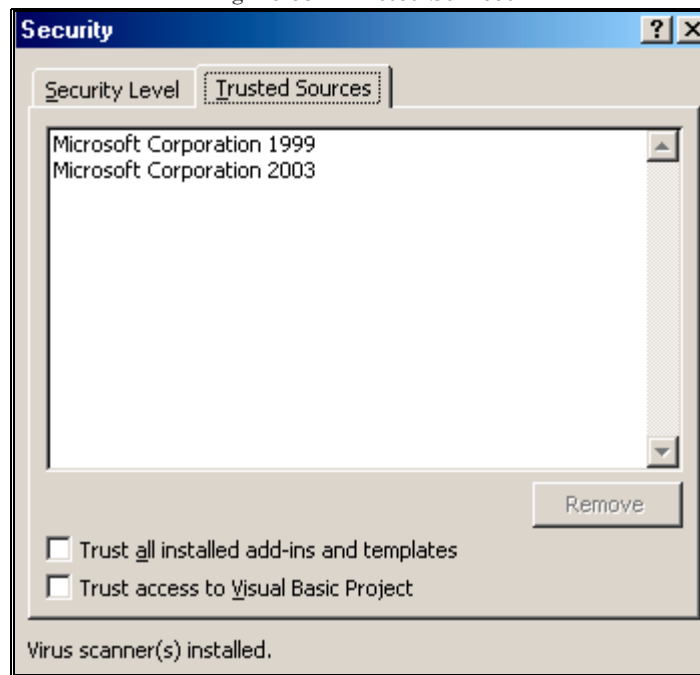


You can allow files with macros if they are from trusted sources. The sources are added to the list under the tab “Trusted Sources.”

Files with macros are not screened if the files are from trusted sources. The dialog informs you if virus-scanning software is installed and active. (Look at the label “Virus scanner(s) installed.”)

The other options are beyond the scope of this book.

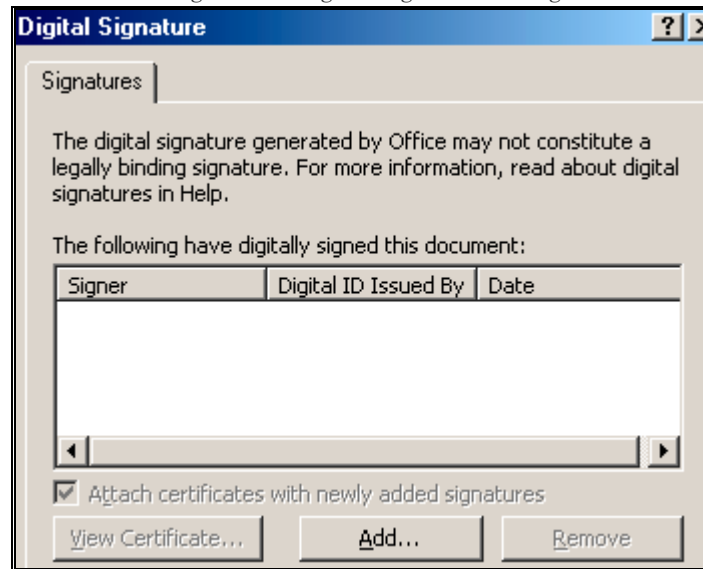
Figure 65: Trusted Sources



Digital Signature

Go back to the main Security dialog. You can digitally sign files using the “Digital Signature” option. A detailed description is beyond the scope of this book.

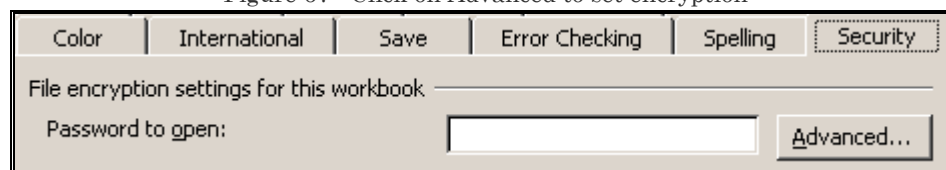
Figure 66: Digital Signature dialog



Encryption

You can set passwords for opening or modifying the file. (These options were discussed earlier in this chapter.) Advanced encryption can further protect your file. Go to the menu option **TOOLS/OPTIONS/SECURITY**, and click on the button *Advanced*.

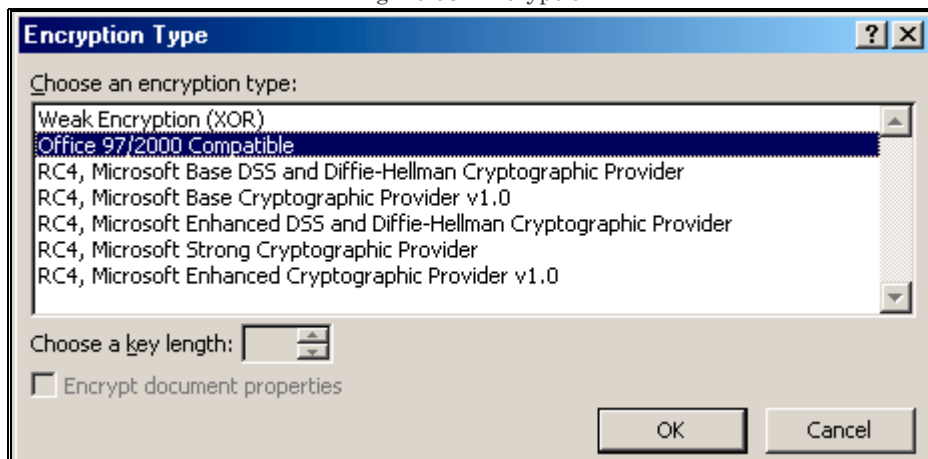
Figure 67: Click on Advanced to set encryption



Several encryption technologies are displayed. The next figure illustrates this.

Choose a technology and follow the guidelines for that encryption technology. A detailed description is beyond the scope of this book.

Figure 68: Encryption



CHAPTER 7

INSERTING COMMENTS

This chapter discusses the following topics:

- ADVANTAGES OF COMMENTS
- INSERTING A COMMENT
- COPYING AND PASTING COMMENTS
- VIEWING THE COMMENTS ON A WORKSHEET
- CHOOSING WHEN TO SEE OR NOT SEE THE “COMMENT INDICATORS”
- CHOOSING TO PRINT OR NOT PRINT COMMENTS

The use of cell-specific “Comments” provides a tool for attaching cell-specific text information (up to 255 characters long) to each cell.

7.1

ADVANTAGES OF COMMENTS

Insertion of comments in text-boxes that are linked to specific cells has several advantages:

- Allows reviewers/readers to comment on the data in specific cells, rows, or columns
- It is better than writing comments on paper

- It allows you to produce fully documented and annotated Excel files
- A simple example will make these advantages apparent.

7.2

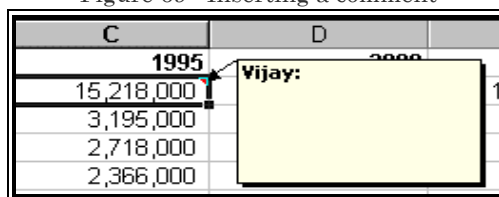
INSERTING A COMMENT

Assume that after looking at the data in cell C2, you feel that the data value did not conform to data on the same series for the same year from another source. You want to place a comment and attach it to cell C2.

First, click on cell C2. Then, go to INSERT/COMMENTS and type in a name.

Note that the text-box is attached to the cell. This is illustrated in Figure 69. The arrow shows the cell referred to by the comment box.

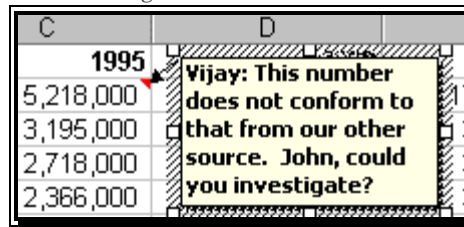
Figure 69: Inserting a comment



Write your comments. An example is shown in Figure 70¹².

¹² In addition, look at cell C2 of the sample file.

Figure 70: A comment



On the top-right of cell C2, you can see a red crescent (right where the arrowhead ends). This is called a “Comment Indicator.” Any cell that has such an indicator has a comment. Whenever the mouse moves over cell C2, the comment box opens up and you will be able to see the comment(s) linked to cell C2.

Try the comment feature— insert comments on several cells. Move the mouse over the cells you have inserted comments on, and you will see the comment box.

7.3

COPYING AND PASTING COMMENTS

Choose the cell with the comment. Highlight the cell(s) on which the comment will be pasted. Pick the menu option **EDIT/PASTE SPECIAL/COMMENTS**.

7.4

VIEWING THE COMMENTS ON A WORKSHEET

Assume you get a worksheet with many cells that have comments. There are several possible ways of reviewing the comments:

- One way of viewing the comments would be to visually locate and then pass the mouse over each comment indicator manually.
- Another way would be to print the comments along with the worksheet and then read the comments from the hard copy.
- An easier way to view comments is to activate the “Comments” floating toolbar — shown in Figure 71. This activation is done by selecting the option VIEW/COMMENTS.

The toolbar shown in Figure 71 opens; it will float over the worksheet. The icons on this toolbar permit you to view all comments one by one:

- The icon with the left-pointing arrow is for “see previous comment”
- The icon with the right-pointing arrow is for “see next comment”

Figure 71: The “Reviewing” or “Comments” toolbar. See chapter 2 on page 35 to learn how to add individual icons or a group of icons to the Excel toolbar.



Go through the icons one-by-one and try them out. Some of them can save time. Think of comments as a box of text attached to each cell. Therefore, a cell contains data/text inside the cell and a comment contains text attached to the cell.

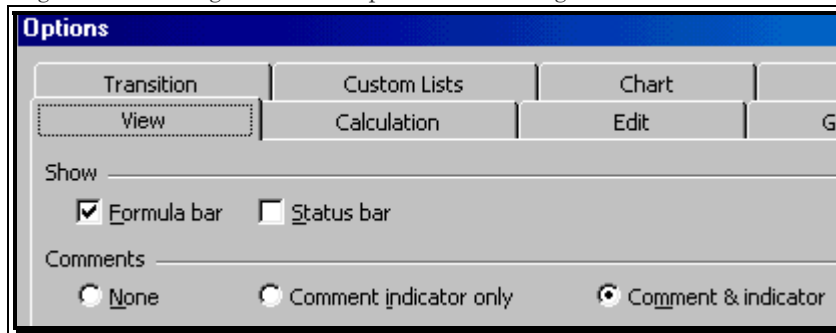
CHOOSING WHEN TO SEE OR NOT SEE THE “COMMENT INDICATORS”

Assume you do not want to see the comment indicators or to see them but not the comments themselves (unless you explicitly ask Excel to show the comments by using VIEW/COMMENTS). You can set the default

behavior for comment and indicator visibility.

Select the option TOOLS/OPTIONS and click on the tab VIEW. (For a pictorial reproduction of this, see Figure 72.) In the area “Comment,” you can set the default environment for viewing/hiding comments/comment indicators:-

Figure 72: Setting the default options for viewing the comments on-screen

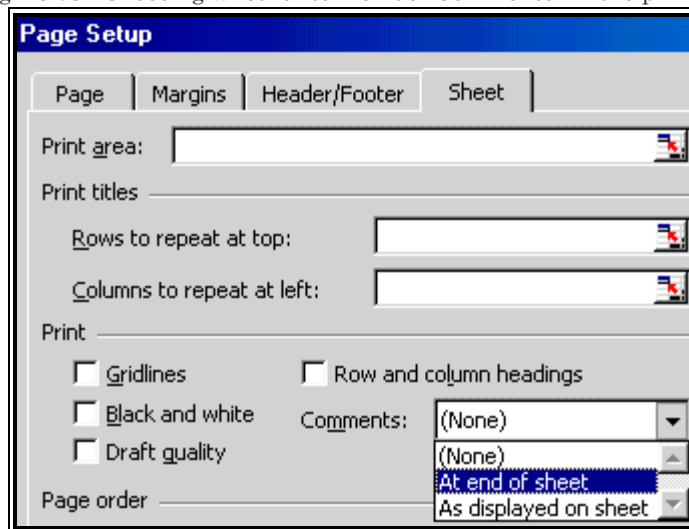


- “None” does not show any comments or comment indicators. I do not recommend this.
- “Comment Indicator only” shows only indicators. A comment is only seen when your mouse moves over the indicator. I recommend this option. (Note: the indicator does not show in printouts).
- “Comment & Indicator” shows the indicators and all the comments on the worksheet. This may be a good option if you want to read all the comments one–after–the–other, but may be overwhelming if too many cells have comments.

Printing comments

- select the menu option FILE/PAGE SETUP,
- click on the tab SHEET, and
- choose the option “at end of sheet” or “as displayed on sheet” in the area “Comments.” (For a pictorial reproduction of this, see Figure 73.)

Figure 73: Choosing whether to include “Comments” in the printout



SELECTING ALL CELLS WITH COMMENTS

You can select all “comments-containing” cells and give them the same formatting, protection, or clear the cell comments/contents/other. The process of selecting all comment containing cells is shown in the first section of chapter 24.

CHAPTER 8

HYPERLINKING

You can hyperlink cells in Excel to cells, ranges, worksheets and some other objects in the same or another Excel file, other files (Excel or other) and web sites. This chapter shows examples of each type of hyperlink.

The topics taught are:

- LINKING TO A RANGE OR OBJECT IN THE SAME FILE
- LINKING TO A FILE
- CREATING A NEW FILE TO LINK TO (ONLY IN EXCEL XP)
- LINKING TO THE WEB
- WEB TOOLBAR

8.1

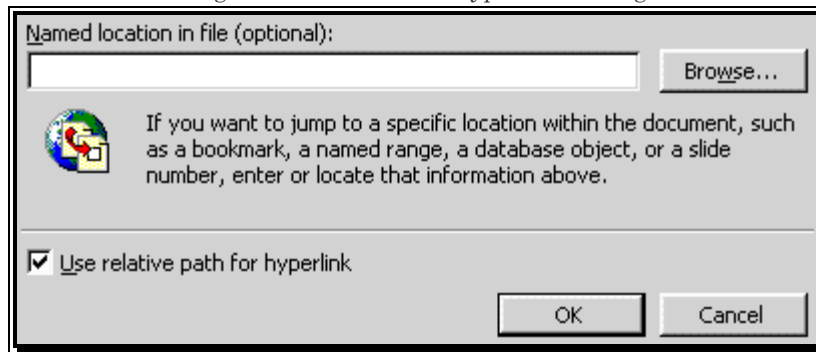
LINKING TO A RANGE OR OBJECT IN THE SAME FILE

In Excel 97

Access the feature through the menu path INSERT/HYPERLINK.

In the area “Named Location in file,” click on the button “Browse as shown in Figure 74.

Figure 74: The “Insert Hyperlink” dialog

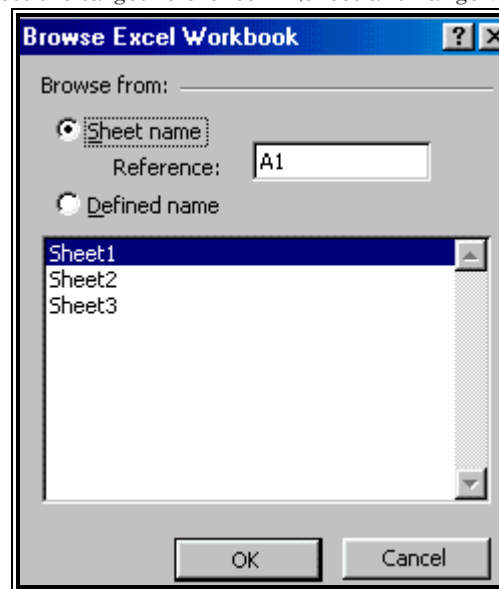


The relevant dialog is shown in Figure 75. Choose the option “Sheet name” and choose the sheet to which you want to hyperlink.

In addition, you can choose a specific cell within the worksheet you choose. In this case, the hyperlink will be to the chosen cell in the chosen worksheet.

In this example, I have chosen cell “A1” in worksheet “Sheet1.”

Figure 75: Select the target reference — (sheet and range within that sheet)

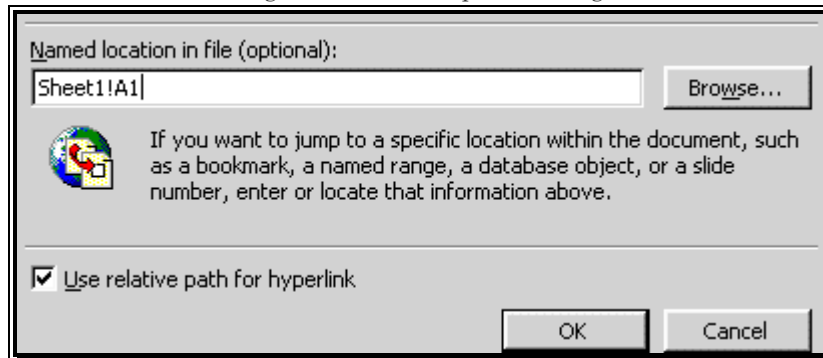


Execute the dialog by clicking on the button OK. Now when you click on

the cell that you hyper linked from, Excel activates and brings on to the screen the cell “A1 “Sheet1.”

You can go back to the original cell (from where you were hyperlinked) by clicking on the “Back” icon.

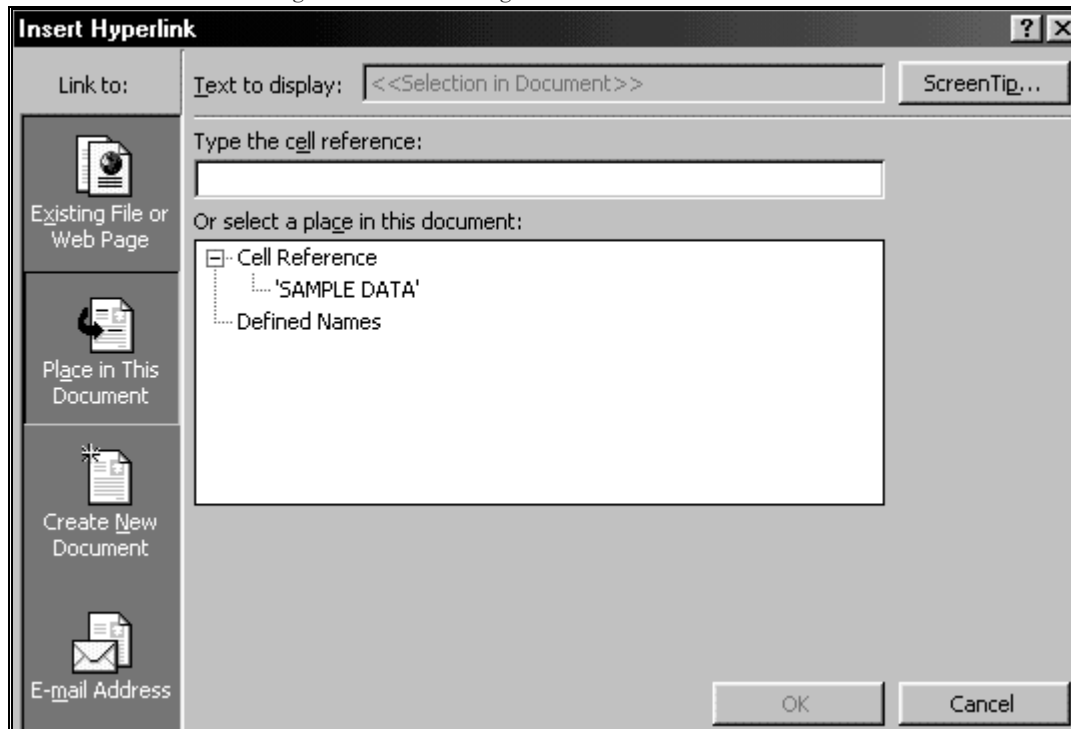
Figure 76: The completed dialog



In Excel XP

In Excel XP, the dialog provides ways and shortcuts to define a hyperlink. The dialog for Insert Hyperlink is reproduced below.

Figure 77: The dialog in the XP version of Excel



8.2

LINKING TO A FILE

In Excel 97

Choose the menu option INSERT/HYPERLINK. In the area “Link to file or URL,” click on the button *Browse* as shown in Figure 78.

Figure 78: Insert Hyperlink dialog



The “Link to File” dialog opens. The dialog is reproduced in Figure 79.

Choose the file to which you want to hyperlink. Execute the dialog by clicking on the button OK.

Figure 79: Choose the file you want to “link to”

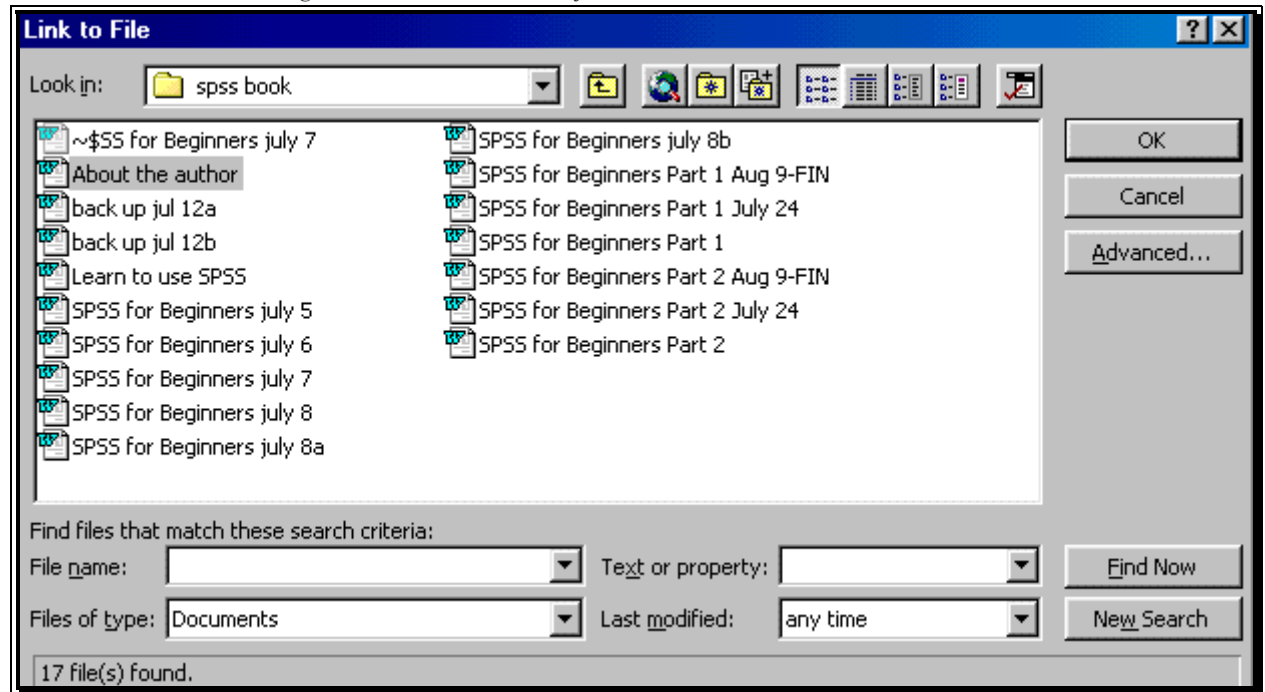
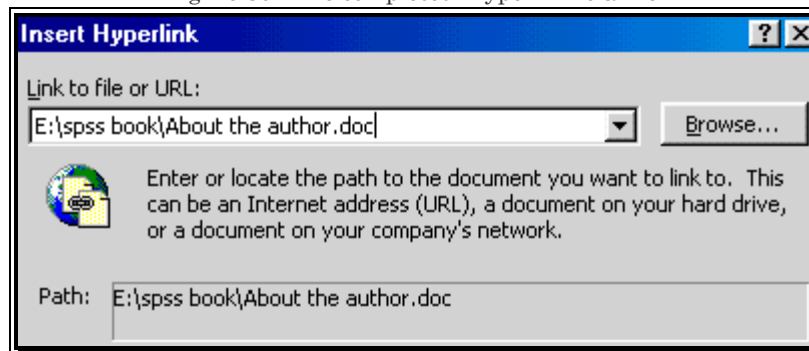


Figure 80: The completed “hyperlink o a file”



Execute the dialog by clicking on the button OK. When the user clicks on the hyperlink, Word will be launched and the file “About the author.doc” will be opened.

You can also define the target as a bookmark or other location in the target file.

In Excel XP

There are several ways to write a reference to the file that is the target of the hyperlink:

- You can “Type the file name”
- Linking to a recently used file: If the file is one you know you have opened recently, then you can try to find it by locating it in the list shown when you click on “Recent files.” An example is shown two figures down.
- Click on the button “File.” Create a new file and link to this file by clicking on “Create new document.” This topic is discussed further in the next section.

In the next figure, I have pointed out to the location of each of these options in the dialog.

Figure 81: Dialog for Insert Hyperlink in the XP version of Excel

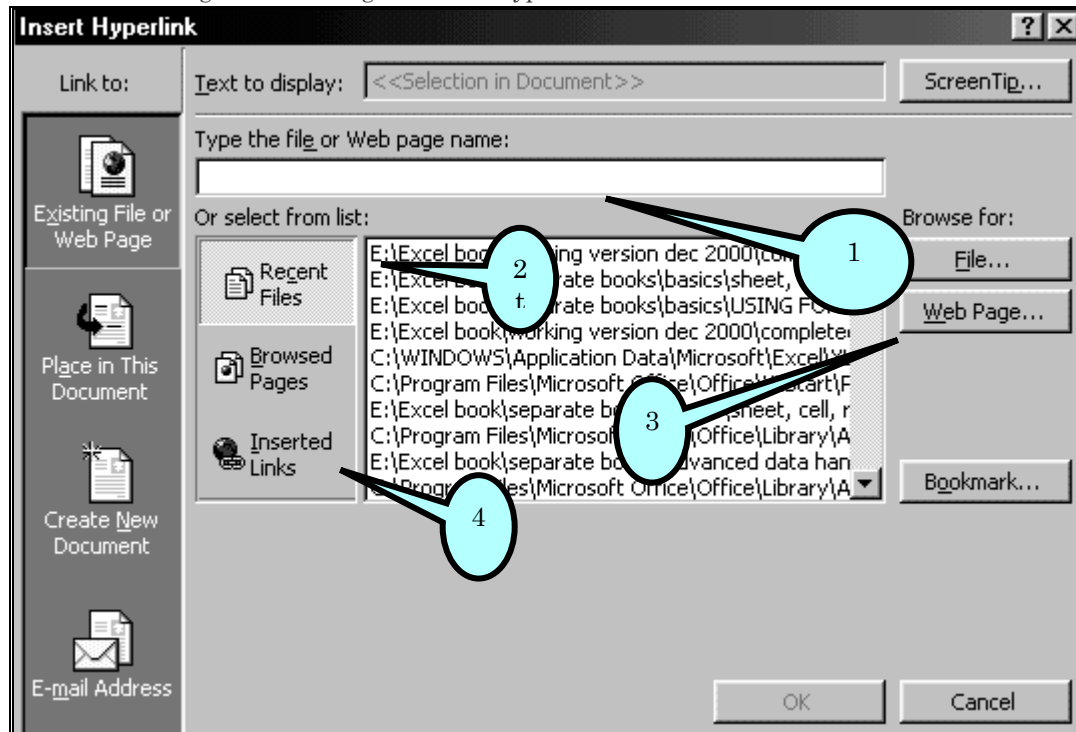
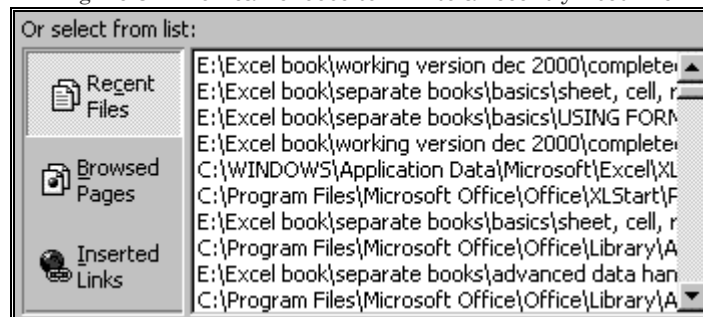


Figure 82: You can choose to link to a recently used file

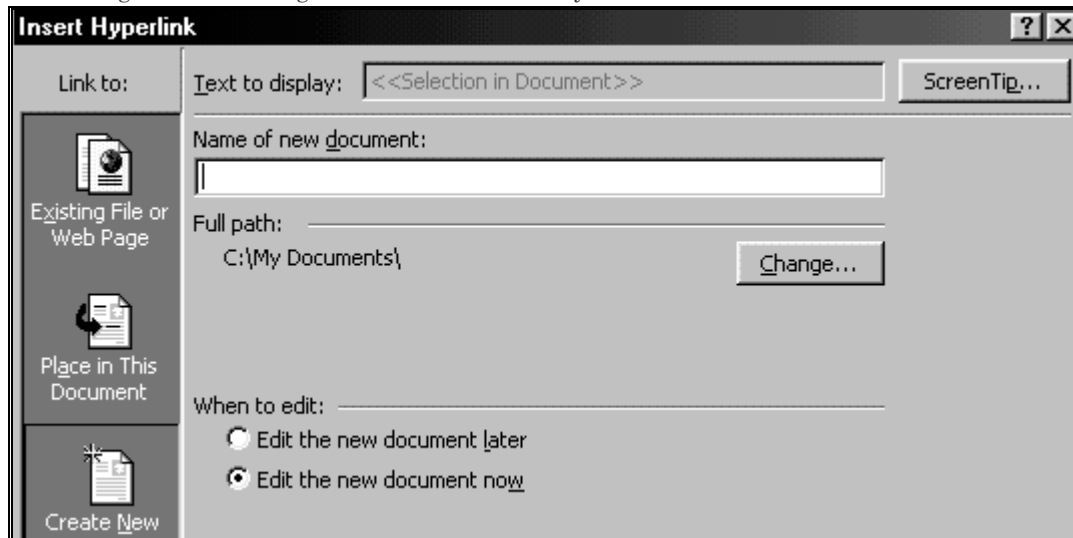


CREATING A NEW FILE TO LINK TO (ONLY AVAILABLE IN THE XP VERSION OF EXCEL)

This feature is useful if you want to create— but not embed— support files (for example, Word documents or PowerPoint presentations) for your Excel file. While working on your Excel file, if you feel that you need to

create a file in another application (or in Excel) and link a certain range in your current file to the new file you create, you can do all that in one smooth process by using linking.

Figure 83: Linking to a “New” file — a file you can work on at this time or later

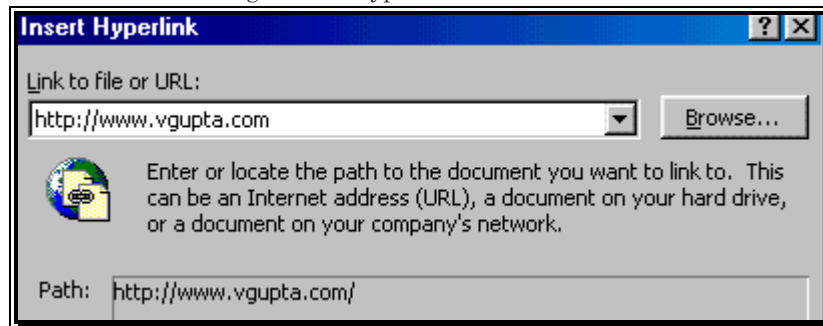


In Excel 97

Using the mouse, select the menu path INSERT/HYPERLINK. In the area “Link to file or URL,” type the full URL (web address) of the site. (For a pictorial reproduction of this, see Figure 84.)

If your modem is active, then clicking on the hyperlink will launch your browser (Netscape/Internet Explorer/AOL/other) take you to the web site vgupta.com.

Figure 84: Hyperlink to a web URL



In Excel XP

Excel XP provides several ways to insert a hyperlink:

- “Type the Web page name” in the text-box shown in the next figure.
- If the web URL is one you know you have visited recently, then you can try to find it by locating it in the list that shows when you click on “Browsed Pages”
- Click on the button “Web Page”
- If the web URL is one you are using often on this Excel file, then you will find the URL when you click on “Inserted links.” An example is shown two figures down.

In the next figure, I have pointed out to the location of each of these options in the dialog.

Figure 85: Options for selecting a web URL

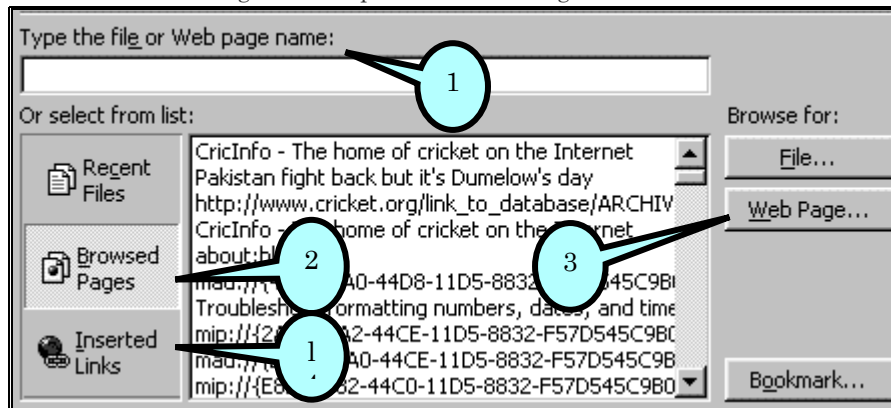
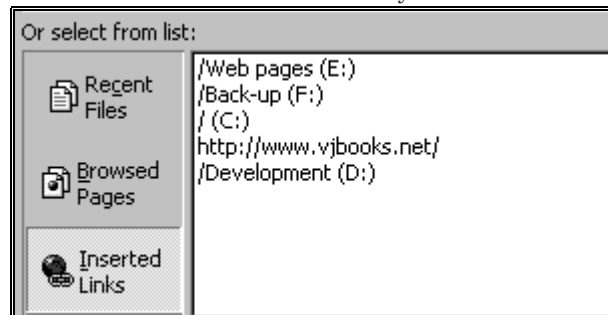


Figure 86: Excel shows the files or URLs already linked from the active Excel file

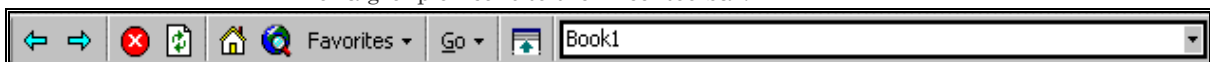


8.5

WEB TOOLBAR

The “Web” toolbar opens automatically if Excel “senses” that you are using hyperlinks or attempting to get on a location on the web or obtain data from the web.

Figure 87: The “Web” toolbar. See chapter 2 on page 35 to learn how to add individual icons or a group of icons to the Excel toolbar.



CHAPTER 9

LINKING & EMBEDDING OBJECTS

The following topics are discussed in this chapter:

- EMBEDDING OBJECTS (FILES) (AND MORE ON USING EXCEL AS AN INFORMATION PATHWAY/OR WEB-TYPE APPLICATION)
- EMBEDDING A PRE-EXISTING OBJECT/FILE
- ENSURING THAT CHANGES IN THE LINKED OBJECT/FILE ARE AUTOMATICALLY UPDATED
- DIFFERENCE BETWEEN “HYPER LINKING TO” A FILE/OBJECT AND EMBEDDING A FILE/OBJECT
- CONCEPTUAL DIAGRAMS
- LINKS MANAGEMENT

This chapter teaches how to embed (and link) files from a range of applications onto an Excel sheet. The embedded “object” is actually a file that is placed inside the Excel sheet. When you double click on the embedded object, the associated file opens in its native application.

Examples of objects one can embed: PowerPoint Slides, PowerPoint Presentations, WordPad Documents, audio files, video files, and Paintbrush Pictures. The entire list will depend on the other applications installed on your computer/network.

While embedded documents exist only as objects within the host Excel file, ‘linked’ files exist as full entities and can be worked on in isolation from the host file. (That is, they are accessed through the File Manager.)

‘Linking’ ensures that the embedded file is updated whenever the original file is updated in its own application.

Assume you have embedded and linked a PowerPoint presentation in the current Excel file. If you make changes to the PowerPoint Presentation in PowerPoint, the changes will be automatically updated in the Excel file.

9.1**EMBEDDING OBJECTS (FILES) (AND MORE ON
USING EXCEL AS AN INFORMATION
PATHWAY/OR WEB-TYPE APPLICATION)**

Files of various types, including multimedia files, can be embedded onto Excel worksheets so that users can read/view the “external” embedded file while in Excel. This capability allows for the construction of workbooks that are more than just spreadsheets.

You can embed PowerPoint Presentations, documents, audio, and video files, and any other file that belongs to an application that supports the OLE Automation protocol. (Do not worry about the term “OLE Automation”—you do not need to know anything about OLE and Automation!)

You can distribute an Excel file after embedding files from other applications. A reader can then access these related files by double-clicking on the embedded file. Therefore, PowerPoint presentations, Excel

worksheets, Word documents, Notepad files, Organization charts, and other file types can be distributed along with the “mother” Excel file.

You can place the icons for the embedded objects at the relevant place in the Excel file. The reader has the option of opening the embedded file or of ignoring it.

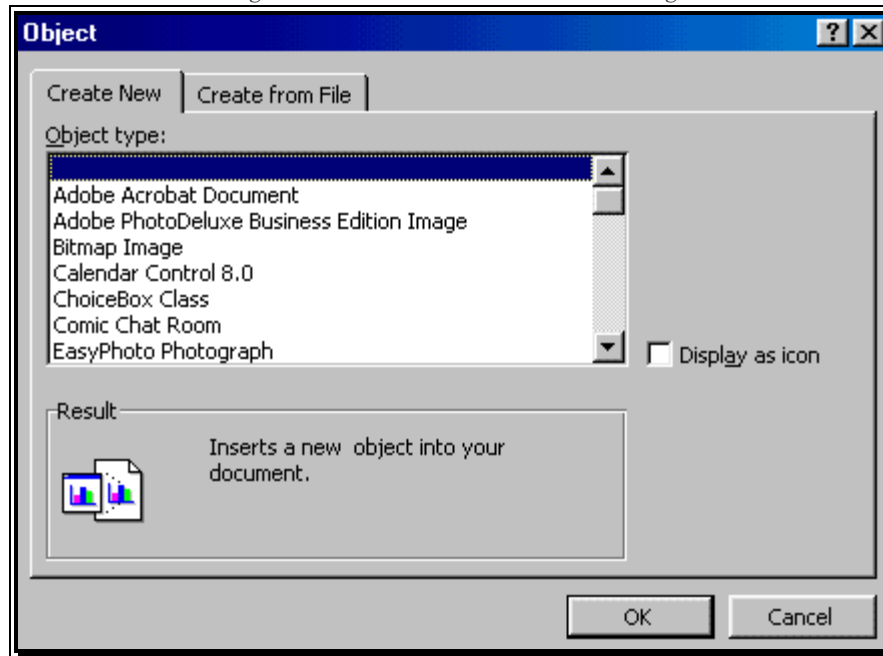
Click on a cell on the sheet at the point where you want the external file or object (I will use the term “object” in the remainder of this chapter). Choose the menu option INSERT/OBJECT.

The dialog shown in Figure 88 opens. Read the list of “Object types” displayed.

On your computer, you may see different items in the list.
--

Scroll down the list and see all the options your computer has.

Figure 88: The INSERT OBJECT dialog



9.2

EMBEDDING A PRE-EXISTING OBJECT/FILE

I do not want to digress into another application/software...so, instead of choosing the tab “Create New” (which would open the other application — for example, Word — and will expect me to compose a new document) I chose “Create from (pre-existing) File” as shown in Figure 89.

You have to select the object (that is, the file) to be embedded. The first step in the selection process is clicking on the button *Browse*. In the *Browse* dialog (user-input form), choose the object (note that, in this context, an “object” is the same as a “file”) you want to embed into Excel. This dialog is shown in Figure 90.

Figure 89: Choosing to insert an existing object/file

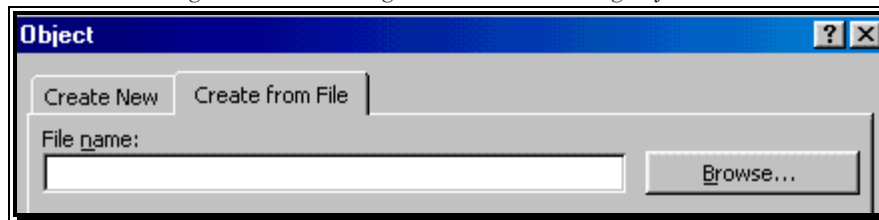
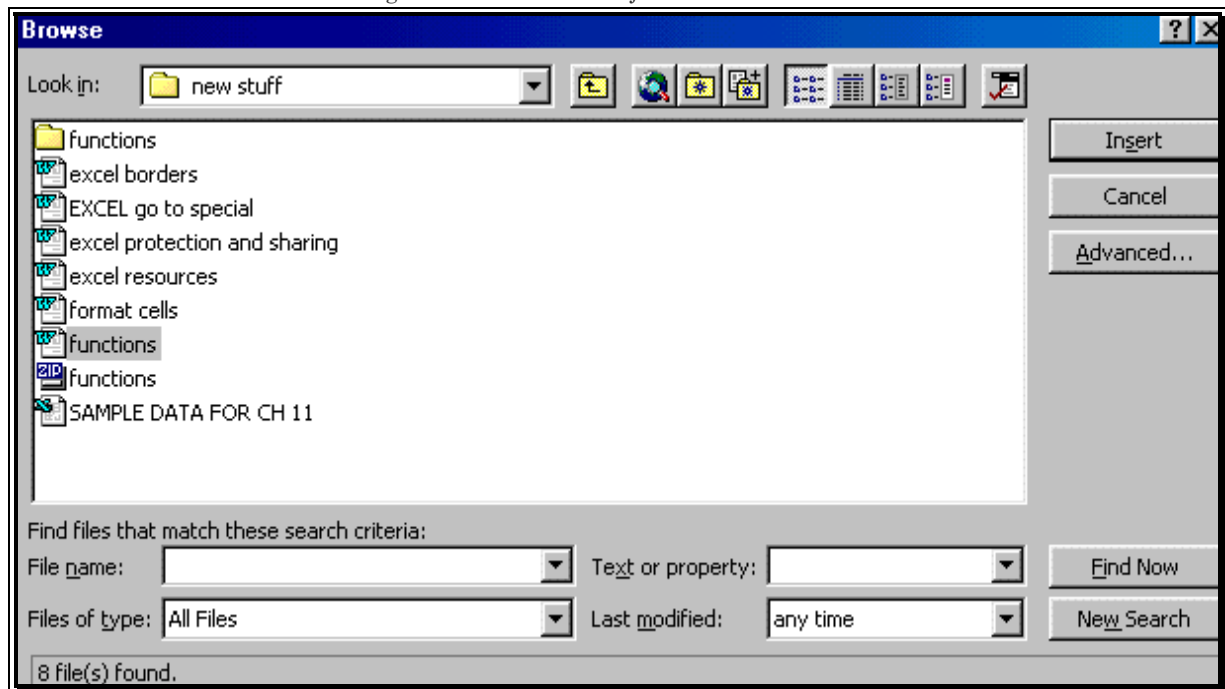


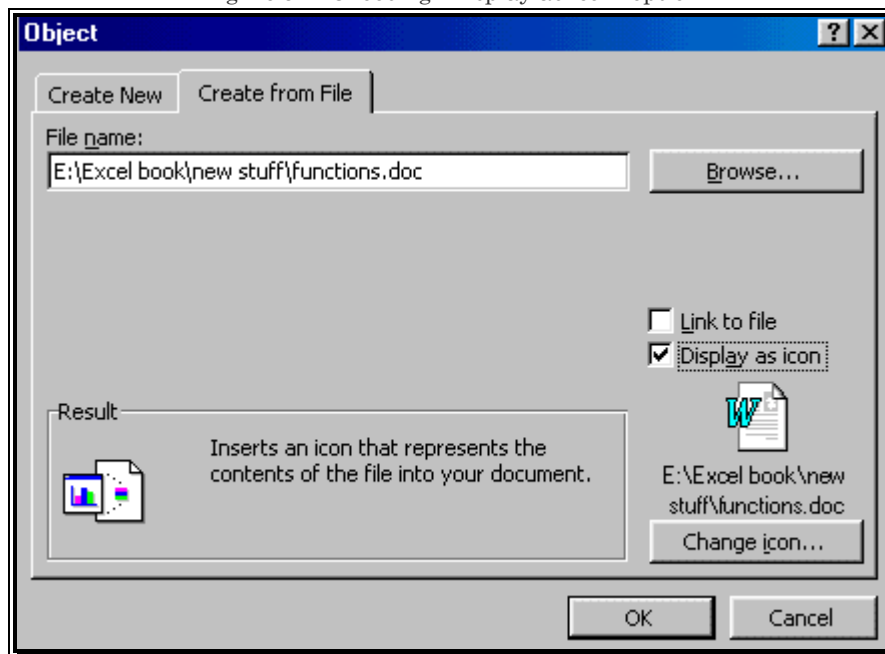
Figure 90: Select the object/file



I chose a Word file and clicked on “Insert.” (You should try to experiment with multimedia files like sound, picture, or movie files.)

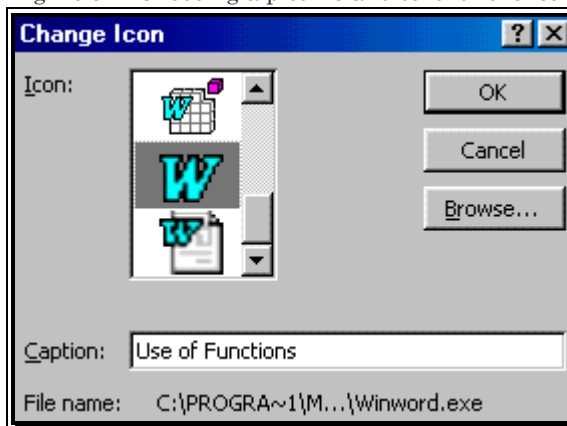
The chosen “object” is displayed in the text-box “File name” as shown in Figure 91. I choose the option “Display as icon.” (If not, then it will be displayed as a Word file, consume system resources and may make the spreadsheet confusing as it blocks a large range of cells.)

Figure 91: Choosing “Display as icon” option



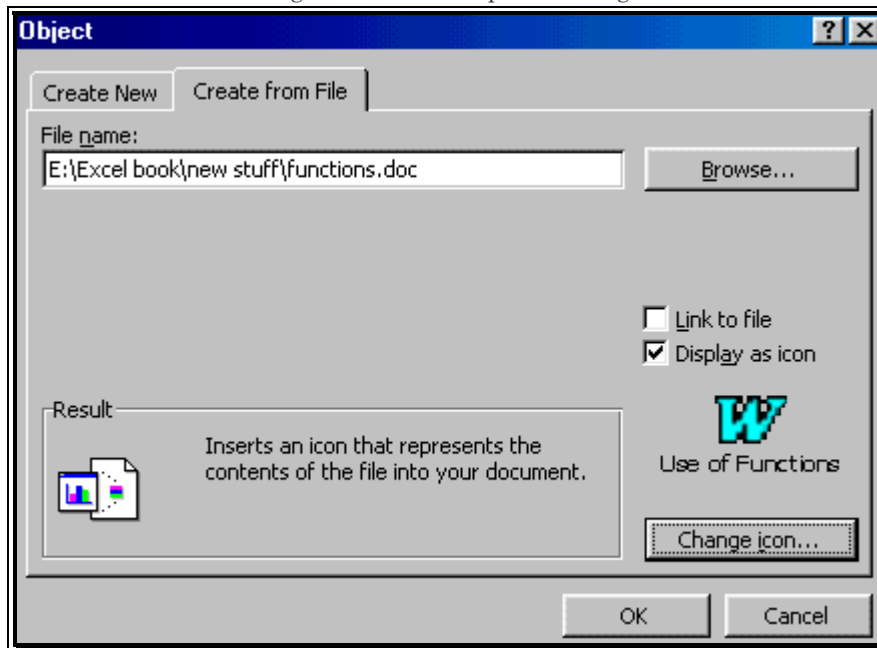
At the bottom–right of the dialog, notice that a default icon and label is chosen by Excel. You may change the label and icon by clicking on the button “Change icon” and making the changes as shown in Figure 92.

Figure 92: Choosing a picture and text for the icon



Choose an icon style and text for the caption on the icon. Execute the dialog by clicking on the button OK. (The previous figure illustrates this).

Figure 93: The completed dialog



The object will be inserted into Excel and a small icon will be displayed on the Excel worksheet as shown in Figure 94.

When you double-click on the icon, the embedded file opens in its own application (in this case Word). In other words, double-clicking on the icon will launch Word and open the linked/embedded file.

Figure 94: The icon is placed on the worksheet. Double-clicking on the icon opens the embedded file in its native application (in this case, in Microsoft Word)

2000	2010
6,284,000	17,846,000
3,521,000	3,776,000
5,730,292	3,577,000
2,699,000	 Use of Functions
2,348,000	
2,075,000	
1,543,000	
2,309,000	

Similarly, you can launch PowerPoint presentations, slide shows, movies,

etc from objects you have inserted/embedded onto an Excel sheet.

The size of the Excel “container” file will increase as you insert more objects. Each object is “embedded” inside Excel, consequently increasing the size of the Excel file. If you save the file to a floppy then all the embedded files are also saved (as objects within the “mother” file.)

9.3

ENSURING THAT CHANGES IN THE LINKED OBJECT/FILE ARE AUTOMATICALLY UPDATED

The automatic updating is achieved by choosing the option “Link to file” when inserting the object/file. If the original object/file changes, the ‘embedded’ version in Excel will also change.

9.4

DIFFERENCE BETWEEN “HYPER LINKING TO” A FILE/OBJECT AND EMBEDDING A FILE/OBJECT

When you hyperlink to a file (see chapter 8 on page 99), the file that is “linked to” is not embedded within the Excel file. Therefore, if you want to distribute the Excel file along with all the other (embedded) files use INSERT/OBJECT. (In addition, deselect the option “Link to file.”) With hyperlinks, an error will be generated if the user of your Excel file does not have all the files in the same locations and have access to the locations as you did when you defined the hyperlinks.

9.5

LINKS MANAGEMENT

The EDIT/LINKS option permits you to break links, update links, modify links, etc.

CHAPTER 10

WRITING FORMULAS

This chapter discusses the following topics:

- THE BASICS OF WRITING FORMULAE
- TOOL FOR USING THIS CHAPTER EFFECTIVELY: VIEWING THE FORMULA INSTEAD OF THE END RESULT
- The A1 VS THE R1C1 STYLE OF CELL REFERENCES
- TYPES OF REFERENCES ALLOWED IN A FORMULA
- REFERENCING CELLS FROM ANOTHER WORKSHEET
- REFERENCING A BLOCK OF CELLS
- REFERENCING NON-ADJACENT CELLS
- REFERENCING ENTIRE ROWS
- REFERENCING ENTIRE COLUMNS
- REFERENCING CORRESPONDING BLOCKS OF CELLS/ROWS/COLUMNS FROM A SET OF WORKSHEETS

The most important functionality offered by a spreadsheet application is the ease and flexibility of writing formulae. In this chapter, I start by showing how to write simple formula and then build up the level of complexity of the formulae.

Within the sections of this chapter, you will find tips and notes on commonly encountered problems or issues in formula writing.

10.1

THE BASICS OF WRITING FORMULAE

This section teaches the basics of writing functions.

10.1.A

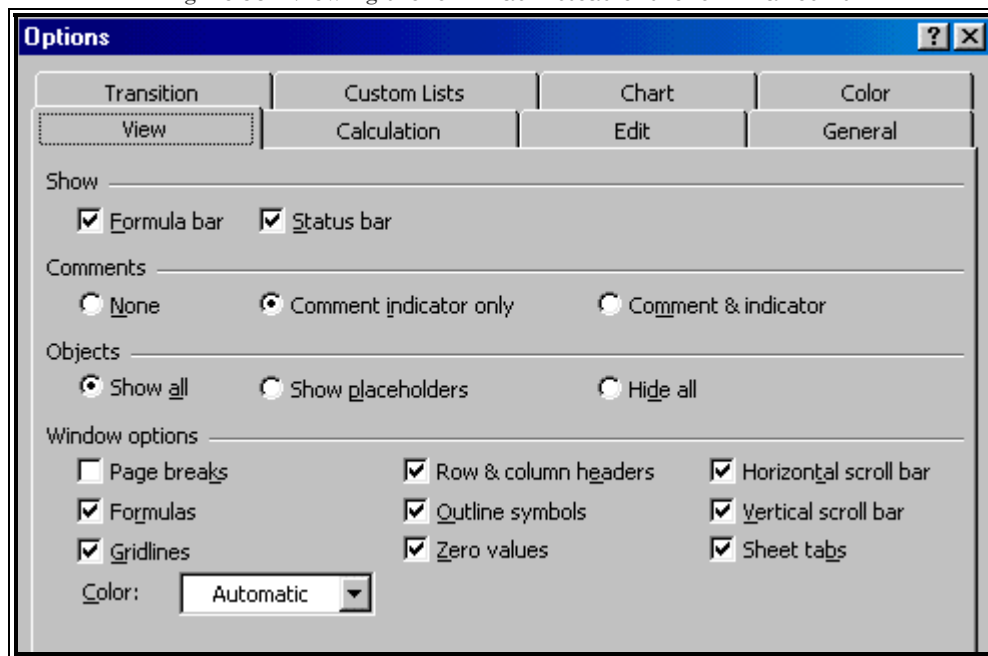
**TOOL FOR USING THIS CHAPTER EFFECTIVELY: VIEWING
THE FORMULA INSTEAD OF THE END RESULT**

For ease of understanding this chapter, I suggest you use a viewing option that shows, in each cell on a worksheet, the formula instead of the result. Follow the menu path **TOOLS/OPTIONS/VIEW**. In the area “Window Options” select the option “Formulas” as shown in Figure 95.

Execute the dialog by clicking on the button **OK**. Go back to the worksheet. The formula will be shown instead of the calculated value.

Eventually you will want to return to the default of seeing the results instead of the formula. Deselect “formula” in the area “Windows Options” in **TOOLS/OPTIONS/VIEW**.

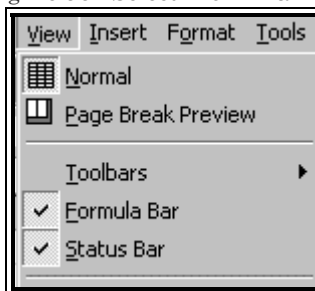
Figure 95: Viewing the formulas instead of the formula result



The effect is only cosmetic; the results will not change. As you shall see later, what you have just done will facilitate the understanding of functions.

In addition, leave the option VIEW/ FORMULA BAR selected as shown in Figure 96.

Figure 96: Select "Formula Bar"

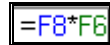


10.1.B

THE “A1” VS. THE “R1C1” STYLE OF CELL REFERENCES

The next figure shows a simple formula. The formula is written into cell G15. The formula multiplies the values inside cells F8 and F6.

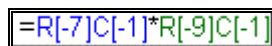
Figure 97: A1-style cell referencing


 A screenshot of a spreadsheet cell containing the formula `=F8*F6`. The text is in a standard font, with the equals sign and asterisk in black, and the cell references F8 and F6 in blue.

This style of referencing is called the “A1” style or “absolute” referencing. The exact location of the referenced cells is written. (The cells are those in the 6th and 8th rows of column F.) One typically works with this style.

However, there is another style for referencing the cells in a formula. This style is called the “R1C1” style or “relative” referencing. The same formula as in the previous figure but in R1C1 style is shown in the next figure.

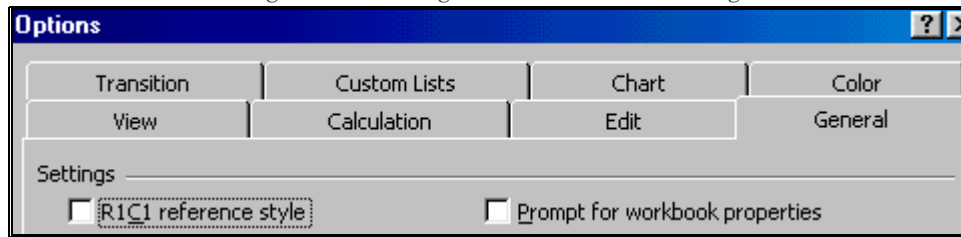
Figure 98: The same formula as in the previous figure, but in R1C1 (Offset-) style cell referencing while the previous figure showed A1 (Absolute-) style cell referencing


 A screenshot of a spreadsheet cell containing the formula `=R[-7]C[-1]*R[-9]C[-1]`. The text is in a standard font, with the equals sign and asterisk in black, and the relative references in blue.

Does not this formula look different? This style uses relative referencing. So, the first cell (F8) is referenced relative to its position in reference to the cell that contains the formula (cell G15). Row 8 is 7 rows below row 15 and column F is 1 column before column G. Therefore, the cell reference is “minus seven rows, minus 1 column” or “R[— 7]C[— 1].”

If you see a file or worksheet with such relative referencing, you can switch all the formulas back to absolute “A1” style referencing by going to **TOOLS/OPTIONS/GENERAL** and deselecting the option “R1C1 reference style.”

Figure 99: Settings for Formula Referencing



10.1.C

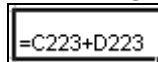
WRITING A SIMPLE FORMULA THAT REFERENCES CELLS

Open the sample file “File3.xls” and choose the worksheet “main.”

Assume you want to write add the values in cells C223¹³ and D223 (that is, to calculate “C223 + D223”) and place the result into cell F223.

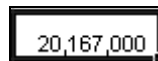
Click on cell F223. Key-in “=” and then write the formula by clicking on the cell C223, typing in “+” then clicking on cell “D223.”

Figure 100: Writing a formula



After writing in the formula, press the key ENTER. The cell F223 will contain the result for the formula contained in it.

Figure 101: The result is shown in the cell on which you wrote the formula



¹³ Cell C223 is the cell in column C and row 223.

10.2

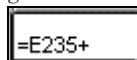
TYPES OF REFERENCES ALLOWED IN A FORMULA

10.2.A

REFERENCING CELLS FROM ANOTHER WORKSHEET

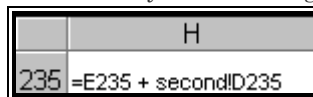
You can reference cells from another worksheet. Choose cell H235 on the worksheet “main.” In the chosen cell, type the text shown in the next figure. (Do not press the ENTER key; the formula is incomplete and you will get an error message if you press ENTER.)

Figure 102: Writing or choosing the reference to the first referenced range



Then select the worksheet “second” and click on cell D235. Now press the ENTER key. The formula in cell H235 of worksheet “main” references the cell D235 from the worksheet “second”. The next figure illustrates this.

Figure 103: Writing or choosing the reference to the second referenced range which is not on the worksheet on which you are writing the formula



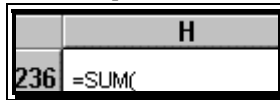
In this formula, the part “second!” informs Excel that the range referenced is from the sheet “second.”

10.2.B

REFERENCING A BLOCK OF CELLS

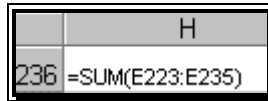
Select the worksheet “main.” Choose cell H236. In the chosen cell, type the text shown in the next figure.

Figure 104: This formula requires a block of cells as a reference



Use the mouse to highlight the block of cells “E223 to E235.” Type in a closing parenthesis and press the ENTER key. The resulting function is shown in the next figure.

Figure 105: Formula with a block of cells as the reference

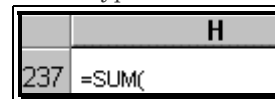


10.2.C

REFERENCING NON-ADJACENT CELLS

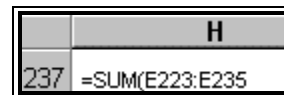
Choose cell H237. Click in the cell and type the text shown in the next figure.

Figure 106: The core function is typed first



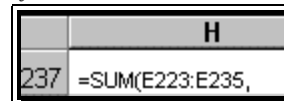
As in the previous example, choose cells E223 to E235 by highlighting them—the formula should look like the one shown in the next figure.

Figure 107: The first block of cells is referenced



Type a comma. The resulting formula should look like that shown in the next figure.

Figure 108: Getting the formula ready for the second block of cells



Highlight the block of cells “E210 to E222.”
Key-in a closing parenthesis and press the
ENTER key.

Figure 109: The formula with
references to two non-adjacent
blocks of cells

	H
237	=SUM(E223:E235,E210:E222)

10.2.D REFERENCING ENTIRE ROWS

Choose cell H238. In this cell, type the text shown in the next figure.

Using the mouse, highlight the rows 197 to 209. Type in a closing
parenthesis and press the ENTER key. The resulting formula is shown in
the next figure.

Figure 110: Referencing entire rows

	H
238	=SUM(197:209)

10.2.E REFERENCING ENTIRE COLUMNS

Choose cell H239. In this cell, type the text shown in the next figure

Using the mouse, highlight the columns C and D. Key-in a closing
parenthesis and press the ENTER key.

Figure 111: Referencing entire columns

	H
239	=SUM(C:D)

10.2.F

REFERENCING CORRESPONDING BLOCKS OF
CELLS/ROWS/COLUMNS FROM A SET OF WORKSHEETS

Assume you have a workbook with six worksheets on similar data from six clients. You want to sum cells “C4 to F56” across all six worksheets.

One way to do this would be to create a formula in each worksheet to sum for that worksheet’s data and then a formula to add the results of the other six formulae.

Another way is using “3–D references.” The row and column make the first two dimensions; the worksheet set is the third dimension. You can use only one formula that references all six worksheets that the relevant cells within them.

While typing the formula,

- Type the “=” sign,
- Write the formula (for example, “Sum”),
- Place an opening parenthesis “(,” then
- Select the six worksheets by clicking at the name tab of the first one and then pressing down SHIFT and clicking on the name tab of the sixth worksheet, and then
- Highlight the relevant cell range on any one of them,
- Type in the closing parenthesis “)”
- And press the ENTER key to get the formula

`=SUM(Sheet1:Sheet6!C4:F56)`

CHAPTER 11

COPYING/CUTTING AND PASTING FORMULAE

This chapter teaches the following topics:

- COPYING AND PASTING A FORMULA TO OTHER CELLS IN THE SAME COLUMN
- COPYING AND PASTING A FORMULA TO OTHER CELLS IN THE SAME ROW
- COPYING AND PASTING A FORMULA TO OTHER CELLS IN A DIFFERENT ROW AND COLUMN
- CONTROLLING CELL REFERENCE BEHAVIOR WHEN COPYING AND PASTING FORMULAE (USE OF THE “\$” KEY)
- USING THE “\$” SIGN IN DIFFERENT PERMUTATIONS AND COMPUTATIONS IN A FORMULA.
- COPYING AND PASTING FORMULAS FROM ONE WORKSHEET TO ANOTHER
- SPECIAL PASTE OPTIONS
- PASTING ONLY THE FORMULA (BUT NOT THE FORMATTING AND COMMENTS)
- PASTING THE RESULT OF A FORMULA, BUT NOT THE FORMULA ITSELF
- CUTTING AND PASTING FORMULAE

-
- THE DIFFERENCE BETWEEN “COPYING AND PASTING”
FORMULAS AND “CUTTING AND PASTING” FORMULAS
 - SAVING TIME BY WRITING, COPYING AND PASTING
FORMULAS ON SEVERAL WORKSHEETS
SIMULTANEOUSLY
-

11.1

COPYING AND PASTING A FORMULA TO OTHER CELLS IN THE SAME COLUMN

Often one wants to write analogous formulae for several cases. For example, assume you want to write a formula analogous to the formula in F223 into each of the cells F224 to F235¹⁴. The quick way to do this is to:

- Click on the “copied from” cell F223.
- Select the option EDIT/COPY. (The menu can also be accessed by right-clicking on the mouse or by clicking on the COPY icon.)
- Highlight the “pasted on” cells F224 to F235 and
- Choose the menu option EDIT/PASTE. (The menu can also be accessed by right-clicking on the mouse or by clicking on the PASTE icon.)
- Press the ENTER key.

The formula is pasted onto the cells F224 to F235 and the cell references

¹⁴ The formula in F223 adds the values in cells that are 3 and 2 columns to the left (that is, cells in columns in C and D.)

within each formula are adjusted¹⁵ for the location difference between the “pasted on” cells and the “copied from” cell.

Figure 112: Pasting a formula

	C	D	E	F
223	9133000	11034000	15223000	=C223+D223
224	1626000	1852000	2818000	=C224+D224
225	1417000	1600000	2255000	=C225+D225
226	1202000	1389000	1802000	=C226+D226
227	976000	1176000	1550000	=C227+D227
228	607000	951000	1339000	=C228+D228
229	464000	589000	1124000	=C229+D229
230	396000	447000	897000	=C230+D230
231	331000	375000	544000	=C231+D231
232	279000	307000	400000	=C232+D232
233	221000	250000	319000	=C233+D233

11.2

COPYING AND PASTING A FORMULA TO OTHER CELLS IN THE SAME ROW

Select the range F223— F235 (which you just created in the previous sub-section). Select the option EDIT/COPY. Choose the range G223— G235 (that is, one column to the right) and choose the menu option EDIT/PASTE. Now click on any cell in the range G223— G235 and see

¹⁵ The formula in the “copied cell” F223 is “C223 + D223” while the formula in the “pasted on” cell F225 is “C225 + D225.” (Click on cell F225 to confirm this.) The cell F225 is two rows below the cell F223, and the copying-and-pasting process accounts for that.

how the column reference has adjusted automatically. The formula in G223 is “D223 + E223” while the formula in F223 was “C223 + D223”.

The next figure illustrates this. Because you pasted one column to the right, the cell references automatically shifted one column to the right. So:

- The reference “C” became “D,” and
- The reference “D” became “E.”

Figure 113: Cell reference changes when a formula is copied and pasted

	F	G
223	=C223+D223	=D223+E223
224	=C224+D224	=D224+E224
225	=C225+D225	=D225+E225
226	=C226+D226	=D226+E226
227	=C227+D227	=D227+E227
228	=C228+D228	=D228+E228
229	=C229+D229	=D229+E229
230	=C230+D230	=D230+E230

The examples in 11.1 on page 131 and 11.2 on page 132 show the use of “Copy and Paste” to quickly replicate formula in a manner that maintains referential parallelism.

COPYING AND PASTING A FORMULA TO OTHER CELLS IN A DIFFERENT ROW AND COLUMN

Select the cell F223. Select the option EDIT/COPY. Choose the range

H224 (that is, two columns to the right and one row down from the copied cell) and choose the menu option EDIT/PASTE. Observe how the column and row references have changed automatically—the formula in H224 is “E224 + F224” while the formula in F223 was “C223 + D223”.

The next figure illustrates this. Because you pasted two columns to the right and one row down, the cell references automatically shifted two columns to the right and one row down. So:

- The reference “C” became “E” (that is, two columns to the right)
- The reference “D” became “F” (that is, two columns to the right)
- The references “223” became “224” (that is, one row down)

Figure 114: Copying and pasting a formula

F	G	H
=C223+D223	=D223+E223	
=C224+D224	=D224+E224	=E224+F224

11.4

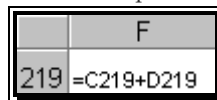
CONTROLLING CELL REFERENCE BEHAVIOR WHEN COPYING AND PASTING FORMULAE (USE OF THE “\$” KEY)

The use of the dollar key “\$” (typed by holding down SHIFT and choosing the key “4”) allows you to have control over the change of cell references in the “Copy and Paste” process. The use of this feature is best shown with some examples.

- The steps in copy and pasting a formula from one range to another:

-
- Click on the “copied from” cell F223.
 - Select the option EDIT/COPY. (The menu can also be accessed by right-clicking on the mouse or by clicking on the COPY icon.)
 - Choose the “pasted on” cell F219 by clicking on it, and
 - Select the menu option EDIT/PASTE. (The menu can also be accessed by right-clicking on the mouse or by clicking on the PASTE icon.)
 - Press the ENTER key.
 - The formula “C219 + D219” will be pasted onto cell F219. (For a pictorial reproduction of this, see Figure 115.)

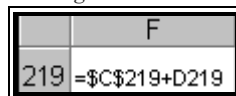
Figure 115: The “pasted-on” cell



	F
219	=C219+D219

Change the formula by typing the dollar signs as shown Figure 116.

Figure 116: Inserting dollar signs in order to influence cell referencing



	F
219	=\$C\$219+D219

Copy cell F219. Paste into G220 (that is, one column to the right and one row down). The dollar signs will ensure that the cell reference is not adjusted for the row or column differential for the parts of the formula

that have the dollar sign before them¹⁶— see the formula in cell F220 (reproduced in Figure 117).

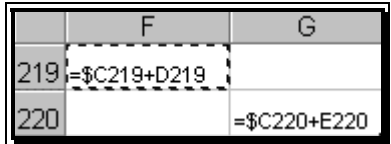
Figure 117: The “copied-from” and “pasted-on” cells with the use of the dollar sign

	F	G
219	=C\$219+D219	
220		=C\$219+E220

For the parts of the cell that do not have the dollar sign before them, the cell references adjust to maintain referential integrity¹⁷.

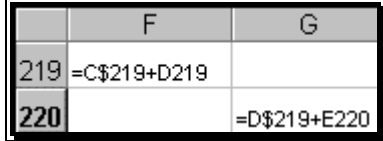
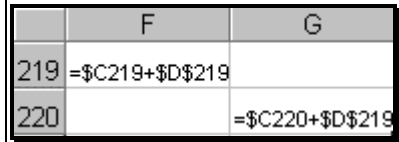
11.4.A

USING THE “\$” SIGN IN DIFFERENT PERMUTATIONS AND COMPUTATIONS IN A FORMULA

<i>The dollar sign in the “copied from” cell</i>	<i>The copy & paste action</i>	<i>The cell references in the “pasted on” cell depend on the location of the dollar signs in the formula in the original, “copied from” cell</i>
Reference behavior with a dollar sign before one of the column references Original cell: F219 = \$C219 + D219	Copy F219 and paste into G220.	Figure: 118: Only the reference to “C” does not adjust because only “C” has a dollar prefix 

¹⁶ In this example, the parts are the “C” reference and “219” reference in “C\$219” part of the formula.

¹⁷ The part “D219” adjusts to “E220” to adjust for the fact that the “pasted on” cell is one column to the right (so “D→E”) and one row below (so “219→220”).

<i>The dollar sign in the “copied from” cell</i>	<i>The copy & paste action</i>	<i>The cell references in the “pasted on” cell depend on the location of the dollar signs in the formula in the original, “copied from” cell</i>
Reference behavior with a dollar sign before one of the row references Original cell: F219 = C\$219 + D219	Copy F219 and paste into G220.	Figure 119: Only the reference to “219” (in the formula part “C\$219”) does not adjust because only that “219” has a dollar prefix 
Reference behavior with a dollar sign before all but one of the row/column references Original cell: F219 = \$C219 + \$D\$219	Copy F219 and paste into G220.	Figure 120: the references to “C,” “D” and to “219” (in the formula part “\$D\$219”) do not adjust because they all have a dollar prefix 
Original cell: F219 = \$C\$219 + \$D\$219	Copy F219 and paste into G220.	Try it... G220 = \$C\$219 + \$D\$219
Original cell: F219 = \$C219 + \$D219	Copy F219 and paste into G220.	Try it... G220 = \$C220 + \$D220
Original cell: F219 = C219 + \$D\$219	Copy F219 and paste into G220.	Try it... G220 = D220 + \$D\$219

11.5

COPYING AND PASTING FORMULAS FROM ONE WORKSHEET TO ANOTHER

The worksheet “second” in the sample data file has the same data as the worksheet you are currently on (“main.”) In the worksheet main, select the cell F219 and choose the menu option EDIT/COPY. Select the worksheet “second” and paste the formula into cell F219. Notice that the formula is duplicated.

11.6

PASTING ONE FORMULA TO MANY CELLS, COLUMNS, ROWS

Copy the formula. Select the range for pasting and paste or “Paste Special” the formula.

11.7

PASTING SEVERAL FORMULAS TO A SYMMETRIC BUT LARGER RANGE

Assume you have different formulas in cells G2, H2, and I2. You want to paste the formula:

— In G2 to G3:G289

— In H2 to H3:H289

— In I2 to I3:I289

Select the range G2:I2. Pick the menu option EDIT/COPY. Highlight the range G3:I289. (Shortcut: select G3. Scroll down to I289 without touching the sheet. Depress the SHIFT key and click on cell I289.) Pick the menu option EDIT/PASTE.

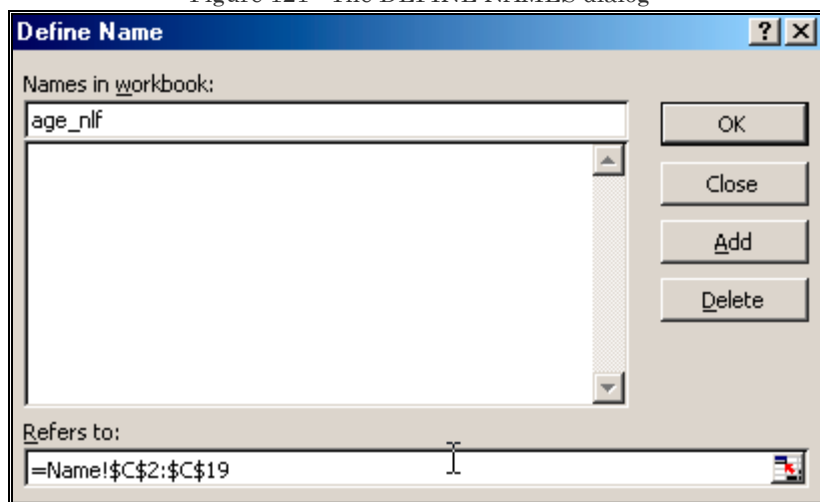
11.8

DEFINING AND REFERENCING A “NAMED RANGE”

You can use range names as references instead of exact cell references. Named ranges are easier to use if the names chosen are explanatory.

First, you have to define named ranges. This process involves informing Excel that the name, for example, “age_nlf,” refers to the range “C2:C19.” Pick the menu option “INSERT/NAME/DEFINE.” The dialog (user-input form) that opens is shown in the next figure. Type the name of the range into the text-box “Names in workbook” and the “Cell References” in the box “Refers to:” See the next figure for an example.

Figure 121: The DEFINE NAMES dialog



Click on the button “Add.” The named range is defined. The name of a

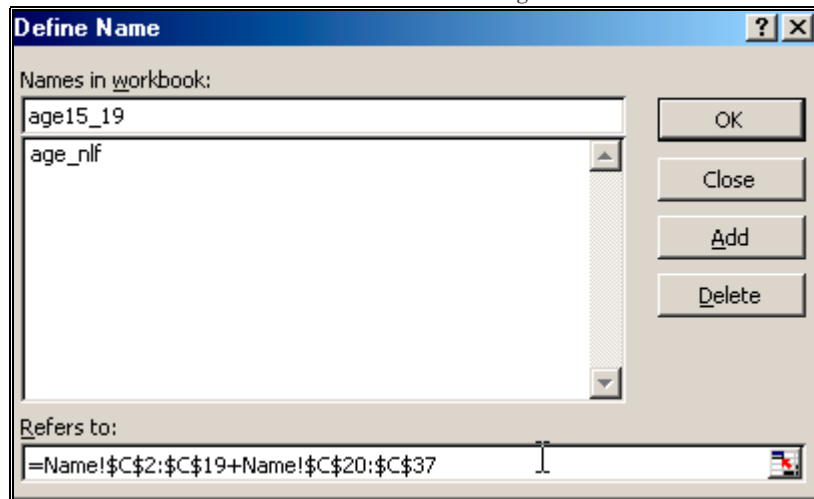
defined range is displayed in the large text-box in the dialog. The next figure illustrates this text.

Figure 122: Once added, the defined named range's name can be seen in the large text-box



Several named ranges can be defined. A named range can represent multiple blocks of cells.

Figure 123: Defining a second named range. On clicking “Add,” the named range is defined, as shown in the next figure.



You can view the ranges represent by any name. Just click on the name in the central text-box and the range represented by the name will be displayed in the bottom box.

Figure 124: Two named ranges are defined

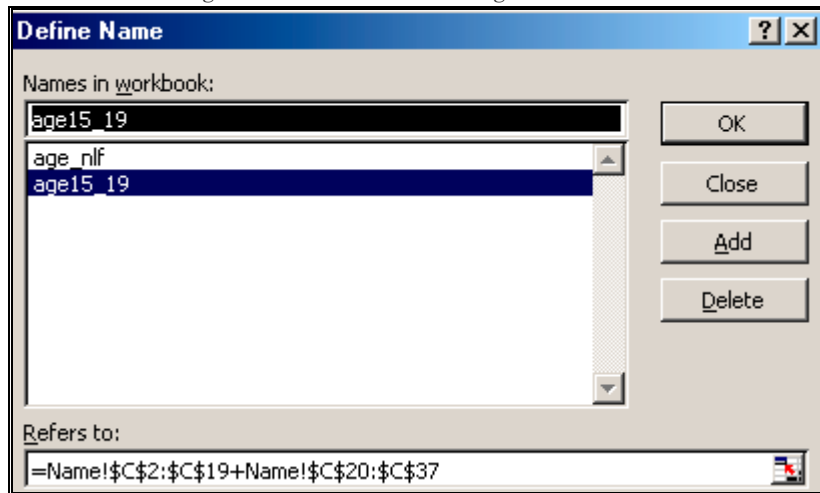
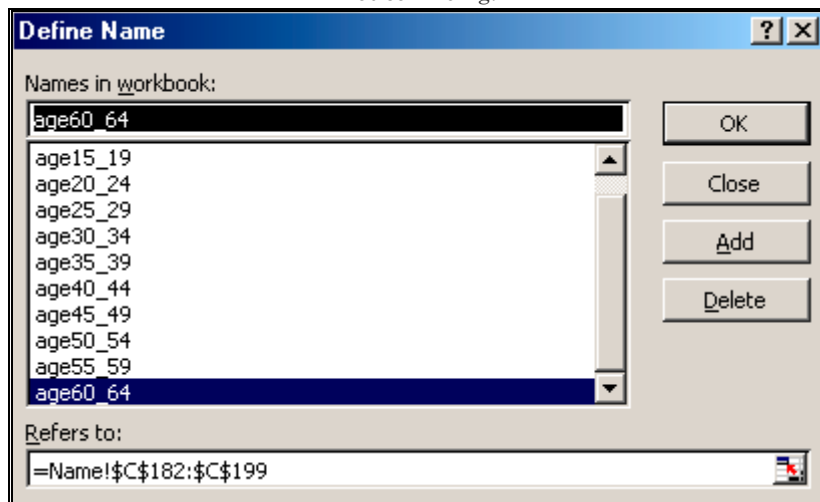


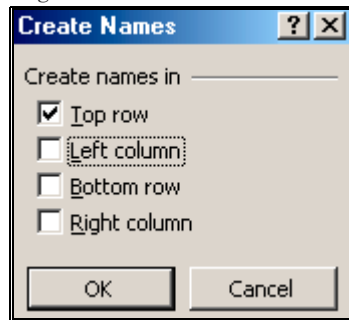
Figure 125: You can define many ranges. Just make sure that the names are explanatory and not confusing.



Adding several named ranges in one step

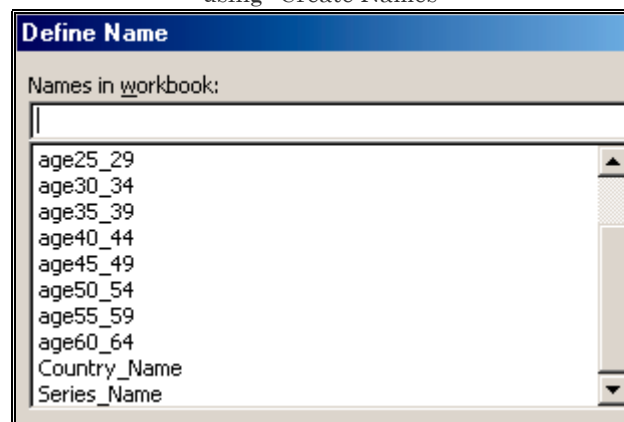
If the first/last row/column in your ranges has the labels for the range, then you can define names for all the ranges using the menu option INSERT/NAMES/CREATE. The dialog is reproduced in the next figure.

Figure 126: CREATE NAMES



In our sample data set, I selected columns “A” and “B” and created the names from the labels in the first row.

Figure 127: The named ranges “Country_Name,” and “Series_Name” were defined in one step using “Create Names”



Using a named range

Named ranges are typically used to make formulas easier to read. The named ranges could also be used in other procedures

Assume you want to sum several of the ranges defined above. One way to sum them would be to select them one-by-one from the worksheet.

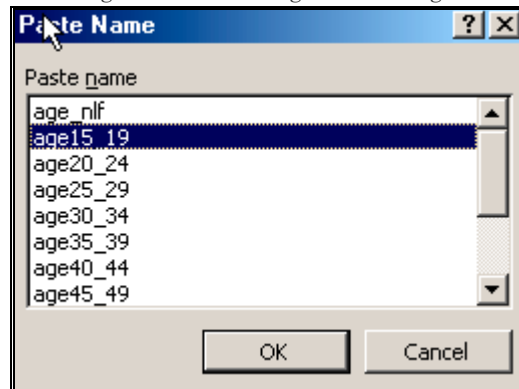
=SUM(

Another way is to use the menu option INSERT/NAME/PASTE to select and paste the names of the ranges. The names are explanatory and reduce the chances of errors in cell referencing.

A reference to the named range is pasted onto the formula as shown below.

=SUM(age15_19)

Figure 128: Pasting named ranges



SELECTING ALL CELLS WITH FORMULAS THAT EVALUATE TO A SIMILAR NUMBER TYPE

This topic is taught in the first section of chapter 24.

11.10

SPECIAL PASTE OPTIONS

11.10.A

PASTING ONLY THE FORMULA (BUT NOT THE
FORMATTING AND COMMENTS)

Refer to page 152 in chapter 12.

11.10.B

PASTING THE RESULT OF A FORMULA, BUT NOT THE
FORMULA ITSELF

Refer to page 150 in chapter 12.

11.11

CUTTING AND PASTING FORMULAE

11.11.A

THE DIFFERENCE BETWEEN “COPYING AND PASTING”
FORMULAS AND “CUTTING AND PASTING” FORMULAS

Click on cell F223, select the option EDIT/CUT, click on cell H224 and choose the menu option EDIT/PASTE. The formula in the “pasted on” cell is the same as was in the “cut from” cell. (The formula “=C223 + D223.”) Therefore, there is no change in the cell references after cutting—and–pasting. While copy—and–paste automatically adjusts for cell reference differentials, cut—and–paste does not.

If you had used copy and paste, the formula in H224 would be “=D224 + E224.”

Figure 129: Cut from cell F223

	F	G	H
223	=C223+D223	=D223+E223	
224	=C224+D224	=D224+E224	

Figure 130: Paste into cell H223. Note that the cell references do not adjust.

	F	G	H
223		=D223+E223	
224	=C224+D224	=D224+E224	=C223+D223

After doing this, select the option EDIT/UNDO because I want to maintain the formulas in F223— F235 (and not because it is required for a cut and paste operation).

11.12

CREATING A TABLE OF FORMULAS USING DATA/TABLE

The menu option DATA/TABLE supposedly offers a tool for creating an X-Y table of formula results. However, the method needs so much data arrangement that it is no better than using a simple copy and paste operation on cells!

11.13

SAVING TIME BY WRITING, COPYING AND PASTING FORMULAS ON SEVERAL WORKSHEETS SIMULTANEOUSLY

Refer to *Volume 1: Excel For Beginners* to learn how to work with multiple worksheets. The section will request you to follow our example of writing

a formula for several worksheets together.

11.14

WORKING SIMULTANEOUSLY ON CELLS IN DIFFERENT WORKSHEETS

Assume your workbook has 18 worksheets, each for a different country. Assume further that all the worksheets have a similar composition— the same variables in the same columns and rows. You want to make some calculations for each country/worksheet. The long way of doing this is calculating separately for each country/worksheet. However, this means that you will be repeating the same step 17 times.

An easier way is to select all the worksheets and do the calculations only once. Whenever you select several worksheets¹⁸ and perform some formatting on a range of cells, rows, or columns in one of the worksheets, the same is automatically conducted for the same range of cells, rows, or columns in all the selected worksheets.

If you write a formula on a cell (for example, in cell “C3”) in one of the worksheets, the same formula is automatically written in the same cell (in

¹⁸ Selecting multiple consecutive worksheets: (a) click on the first sheet, (b) press down on the SHIFT key, and, (c) click on the last sheet. Selecting multiple non-consecutive worksheets: (a) click on the first sheet, (b) press down on the CTRL key, and, (c) one by one, click on the other worksheets you want to select. If a sheet is selected successfully, its sheet tab will be highlighted.

cell “C3”) on all the selected worksheets. Whenever you copy and paste formulas or cell values in one worksheet, the same copy and paste action is replicated on the other worksheets.

Try this Once again, as the other sections in this chapter, this feature is best learned by practice. So, try it out on the sample file “Files1.xls.” In that file, all the worksheets whose names are country names (see the worksheets “Algeria,” “Bahrain,” ... , “Yemen”) are identical in their structure.

- In cell D5 of each cell, I wanted the formula “= (C5/C4) — 1.” I selected all the worksheets and typed the formula into cell D5 of only one of the worksheets. The formula was automatically replicated on all the worksheets I had selected.
- Write the formula “= (C6/C5) — 1” into cell D6 of all these worksheets using this method. With all the worksheets selected, try different things like formatting cells, changing the width of columns, etc. Notice that you only have to work on one worksheet, and the work is automatically replicated for all the selected worksheets.

The use of this feature is optimized if data in separate worksheets is arranged in a manner that facilitates work on several sheets.

CHAPTER 12

PASTE SPECIAL

This chapter teaches the following topics:

- PASTING THE RESULT OF A FORMULA, BUT NOT THE FORMULA
- OTHER SELECTIVE PASTING OPTIONS
- PASTING ONLY THE FORMULA (BUT NOT THE FORMATTING AND COMMENTS)
- PASTING ONLY FORMATS
- PASTING DATA VALIDATION SCHEMES
- PASTING ALL BUT THE BORDERS
- PASTING COMMENTS ONLY
- PERFORMING AN ALGEBRAIC “OPERATION” WHEN PASTING ONE COLUMN/ROW/RANGE ON TO ANOTHER
- MULTIPLYING/DIVIDING/SUBTRACTING/ADDING ALL CELLS IN A RANGE BY A NUMBER
- MULTIPLYING/DIVIDING THE CELL VALUES IN CELLS IN SEVERAL “PASTED ON” COLUMNS WITH THE VALUES OF THE COPIED RANGE
- SWITCHING ROWS TO COLUMNS

This less known feature of Excel has some great options that save time and reduce annoyances in copying and pasting.

12.1

PASTING THE RESULT OF A FORMULA, BUT NOT THE FORMULA

Sometimes one wants the ability to copy a formula (for example, “=C223 + D223”) but paste only the resulting value. (The example that follows will make this clear.)

Select the range “F223:F235” on worksheet “main.”

Choose the menu option FILE/NEW and open a new file. Go to any cell in this new file and choose the menu option EDIT/PASTE SPECIAL.

In the area “Paste,” choose the option “Values” as shown in Figure 131.

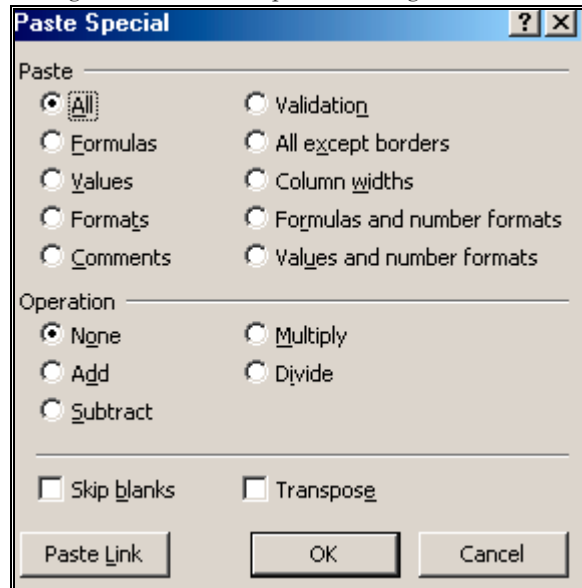
Figure 131: The PASTE SPECIAL dialog in Excel versions prior to Excel XP



In Excel XP, the “Paste Special” dialog has three additional options:

- Paste Formulas and number formats (and not other cell formatting like font, background color, borders, etc)
- Paste Values and number formats (and not other cell formatting like font, background color, borders, etc)
- Paste only “Column widths.”

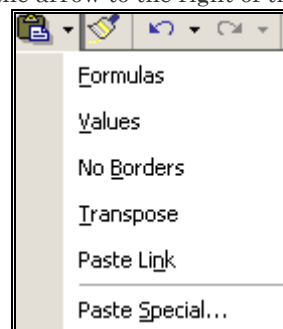
Figure 132: “Paste Special” dialog In Excel XP



In Excel XP, the “Paste” icon provides quick access to some types of “Paste Special.” The options are shown in the next figure.

The calculated values in the “copied” cells are pasted. The formula is not pasted. Try the same experiment using EDIT/PASTE instead of EDIT/PASTE SPECIAL. The usefulness of the former

Figure 133: The pasting options can be accessed by clicking on the arrow to the right of the “Paste” icon

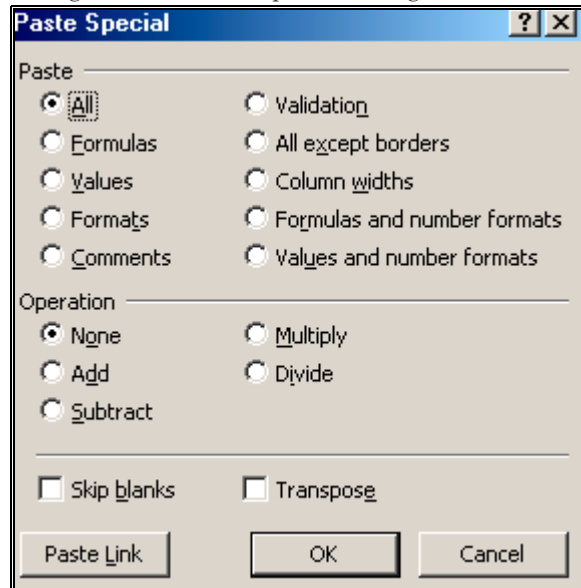


In Excel XP, the “Paste Special” dialog has three additional options:

- Paste Formulas and number formats (and not other cell formatting like font, background color, borders, etc)
- Paste Values and number formats (and not other cell formatting like font, background color, borders, etc)
- Paste only “Column widths.”

will be apparent.

Figure 132: “Paste Special” dialog In Excel XP



12.2

OTHER SELECTIVE PASTING OPTIONS

12.2.A

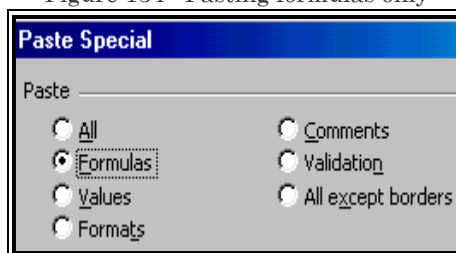
PASTING ONLY THE FORMULA (BUT NOT THE FORMATTING AND COMMENTS)

Choose the option “Formulas” in the area “Paste” of the dialog (user-input form) associated with the menu “EDIT/PASTE SPECIAL.” This feature makes the pasted values free from all cell references. The “pasted on”

range will only contain pure numbers.

The biggest advantage of this option is that it enables the collating of formula results in different ranges/sheets/workbooks onto one worksheet without the bother of maintaining all the referenced cells in the same workbook/sheet as the collated results.

Figure 134: Pasting formulas only



12.2.B PASTING ONLY FORMATS

Choose the option “Formats” in the area “Paste” of the dialog associated with the menu “EDIT/PASTE SPECIAL use the “Format Painter” icon. I prefer using the icon.

Refer to *Volume 1: Excel for Beginners* for a discussion on the format painter.

12.2.C PASTING DATA VALIDATION SCHEMES

Pick the option “Validation” in the area “Paste” of the dialog associated with the menu “EDIT/PASTE SPECIAL.” Data validation schemes are discussed in *Volume 4: Managing & Tabulating Data in Excel*. This option can be very useful in standardizing data entry standards and rules

across an institution.

12.2.D PASTING ALL BUT THE BORDERS

Choose the option “All except borders” in the area “Paste” of the dialog associated with the menu “EDIT/PASTE SPECIAL.” All other formatting features, formulae, and data are pasted. This option is rarely used.

12.2.E PASTING COMMENTS ONLY

Pick the option “Comments” in the area “Paste” of the dialog associated with the menu “EDIT/PASTE SPECIAL.” Only the comments are pasted. The comments are pasted onto the equivalently located cell. For example, a comment on the cell that is in the third row and second column that is copied will be pasted onto the cell that is in the third row and second column of the “pasted on” range. This option is rarely used.

12.3 PERFORMING AN ALGEBRAIC “OPERATION” WHEN PASTING ONE COLUMN/ROW/RANGE ON TO ANOTHER

12.3.A MULTIPLYING/DIVIDING/SUBTRACTING/ADDING ALL CELLS IN A RANGE BY A NUMBER

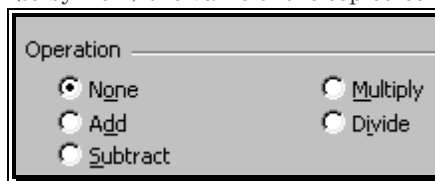
Assume your data is expressed in millions. You need to change the units to billions— that is, divide all values in the range by 1000. The complex

way to do this would be to create a new range with each cell in the new range containing the formula “cell in old range/1000.” A much simpler way is to use PASTE SPECIAL.

On any cell in the worksheet, write the number 1000. Click on that cell and copy the number. Choose the range whose cells need a rescaling of units. Go to the menu option EDIT/PASTE SPECIAL and choose “Divide” in the area *Options*. The range will be replaced with a number obtained by dividing each cell by the copied cells value!

The same method can be used to multiply, subtract or add a number to all cells in a range

Figure 135: You can multiply (or add/subtract/divide) all cells in the “pasted on” range by (to/by/from) the value of the copied cell



12.3.B MULTIPLYING/DIVIDING THE CELL VALUES IN CELLS IN SEVERAL “PASTED ON” COLUMNS WITH THE VALUES OF THE COPIED RANGE

You can use the same method to add/subtract/multiply/divide one column’s (or row’s) values to the corresponding cells in one or several “pasted on” columns (or rows).

Try this Copy the cells in column E and paste special onto the cells in columns C and D choosing the option “Add” in the area “Operation” of the paste special dialog. (You can use EDIT/UNDO to

restore the file to its old state.)

12.4

SWITCHING ROWS TO COLUMNS

Choose any option in the “Paste” and “Operations” areas and choose the option “Transpose.” If pasting a range with many columns and rows you may prefer to paste onto one cell to avoid getting the error “Copy and Paste areas are in different shapes.”

CHAPTER 13

INSERTING FUNCTIONS

This chapter teaches the following topics:

- A SIMPLE FUNCTION
- FUNCTIONS THAT NEED MULTIPLE RANGE REFERENCES
- WRITING A “FUNCTION WITHIN A FUNCTION”
- NEW IN EXCEL XP
- RECOMMENDED FUNCTIONS IN THE FUNCTION WIZARD
- EXPANDED AUTOSUM FUNCTIONALITY
- FORMULA EVALUATOR
- FORMULA ERROR CHECKING

13.1

BASICS

Excel has many in-built functions. The functions may be inserted into a formula.

Accessing the functions dialog/wizard

- (a) select the menu path INSERT/FUNCTION, or

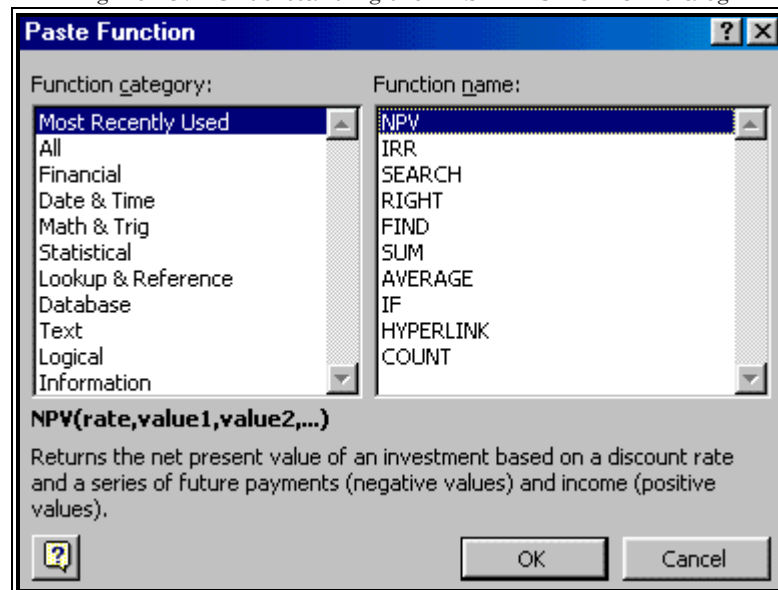
(b) click on the function icon (see Figure 136)

Figure 136: The Function icon



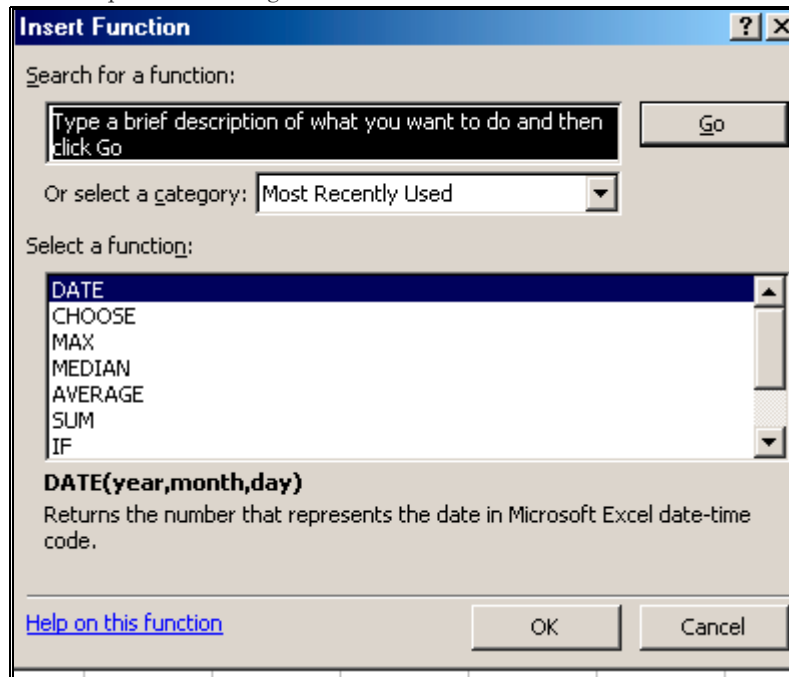
The “Paste Function” dialog (or wizard, because it is a series of dialogs) opens. The dialog is shown in Figure 137.

Figure 137: Understanding the PASTE FUNCTION dialog



The equivalent dialog in the XP version of Excel is called INSERT FUNCTION. (It is reproduced in the next figure below.) The dialog has one new feature—a “Search for a function” utility. The “Function category” is now available by clicking on the list box next to the label “Or select a category.”

Figure 138: The equivalent dialog in the XP version of Excel is called INSERT FUNCTION



This dialog has three parts:

- (1) The area “Function category” on the left half shows the labels of each group of functions. The group “Statistical” contains statistical functions like “Average” and “Variance.” The group “Math & Trig” contains algebra and trigonometry functions like “Cosine.” When you click on a category name, all the functions within the group are listed in the area “Function name.”
- (2) The area “Function name” lists all the functions within the category selected in the area “Function category.” When you click on the name of a function, its formula, and description is shown in the gray area at the bottom of the dialog.
- (3) The area with a description of the function

Step 2 for using a function in a formula

Click on the “Function category” (in area 1 or the left half of the dialog)

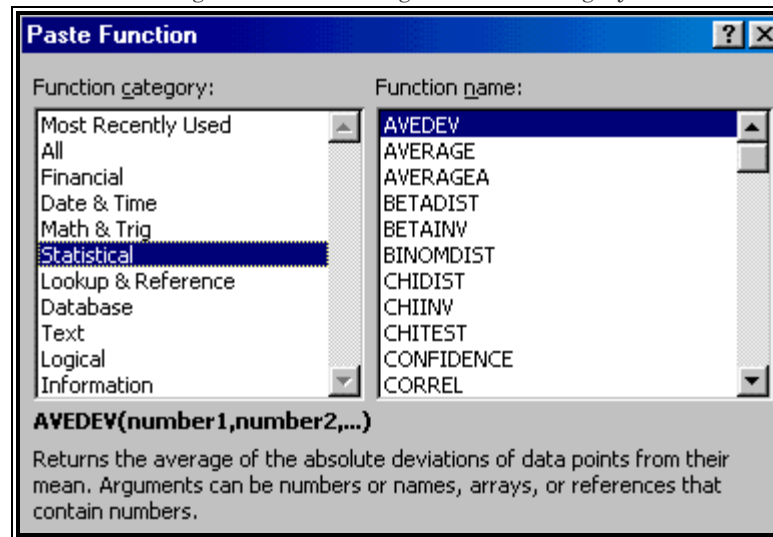
that contains the function, then click on the function name in the area “Function name” (in area 2 or the left half of the dialog) and then execute the dialog by clicking on the button OK.

13.2

A SIMPLE FUNCTION

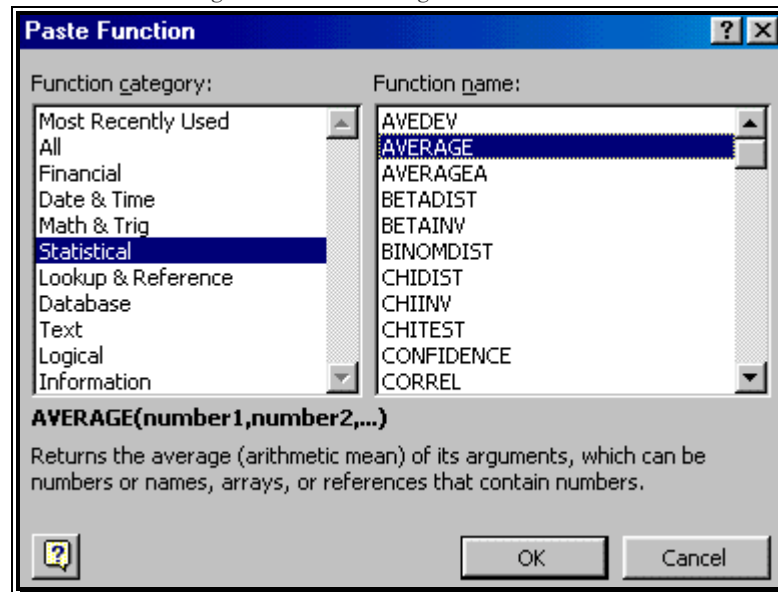
In my first example, I show how to select and use the function “Average” which is under the category “Statistical.” Choose the category “Statistical” as shown in Figure 139.

Figure 139: Choosing a function category



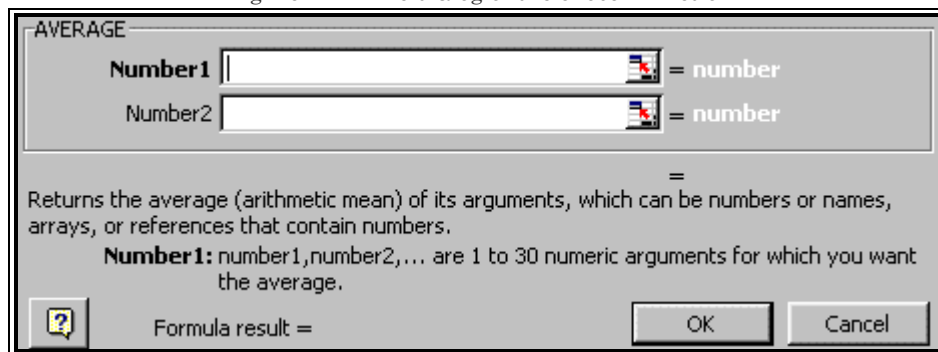
Choose the formula “Average” in the area “Function name.” This is shown in Figure 140. Execute the dialog by clicking on the button OK.

Figure 140: Choosing a function name



The dialog (user-input form) for the “Average” function opens. For a pictorial reproduction of this, see Figure 141.

Figure 141: The dialog of the chosen function



Step 3 for inserting a function — defining the data arguments/requirements for the function

Figure 142: Selecting the cell references whose values will be the inputs into the function



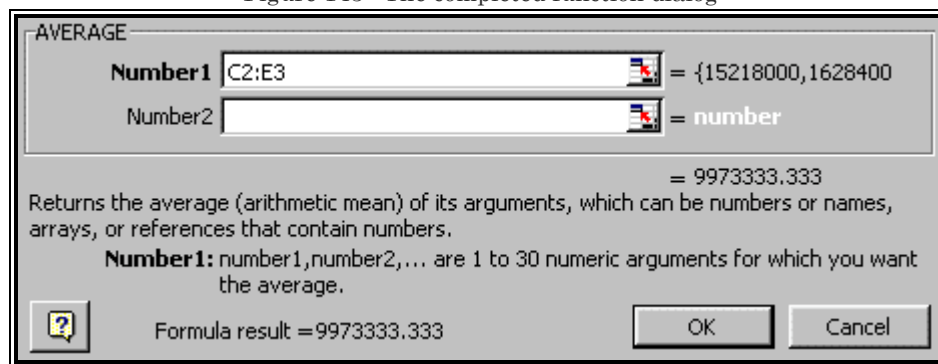
You have to tell Excel which cells contain the data to which you want to apply the function “AVERAGE.” Click on the right edge of the text-box “Number1”¹⁹. (That is, on the red–blue–and–white corner of the cell.) Go to the worksheet that has the data you want to use and highlight the range “C2 to E3.” Click on the edge of the text-box. (For a pictorial reproduction of this, see Figure 142.)

You will be taken back to the “Average” dialog. Notice that — as shown in Figure 143 — the cell reference “C2:E3” has been added.

Furthermore, note that the answer is provided at the bottom (see the line “Formula result = 9973333.333”).

Execute the dialog by clicking on the button OK.

Figure 143: The completed function dialog



¹⁹ If you want to use non-adjacent ranges in the formula, then use the text-box “Number 2” for the second range. Excel will add more text-boxes once you fill all the available ones. If the label for a text-box is not in bold then it is not essential to fill that text-box. In the AVERAGE dialog shown in Figure 402, the label for the first text-box (“Number 1”) is in bold—so it has to be filled. The label for the second text-box (“Number 2”) is not in bold — so, it can be left empty.

The formula is written into the cell and is shown in Figure 144.

Figure 144: The function is written into the cell



=AVERAGE(C2:E3)

Press the ENTER key and the formula will be calculated.

You can work with this formula in a similar manner as a simple formula — copying and pasting, cutting and pasting, writing on multiple worksheets, etc.

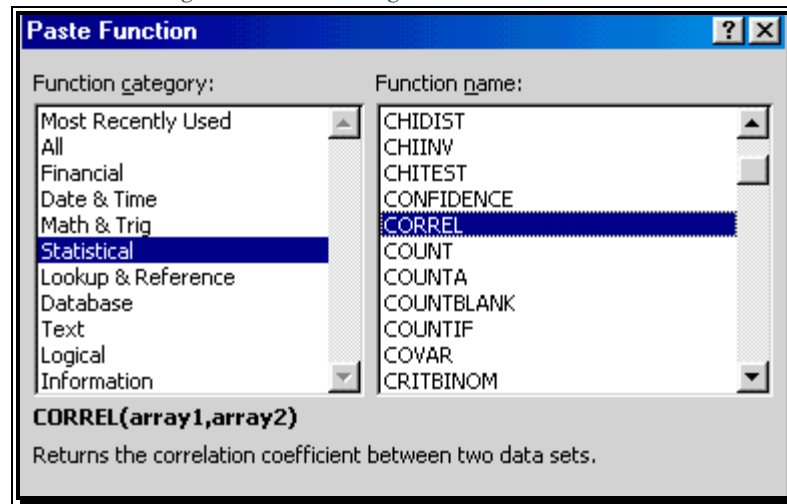
If you remember the function name, you do not have to use INSERT/FUNCTION. Instead, you can simply type in the formulas using the keyboard. This method is faster but requires that you know the function.

FUNCTIONS THAT NEED MULTIPLE RANGE REFERENCES

Some formulas need a multiple range reference. One example is the correlation formula (“CORREL”). Assume, in cell J1, you want to calculate the correlation between the data in the two ranges: “D2 to D14” and “E2 to E14.”

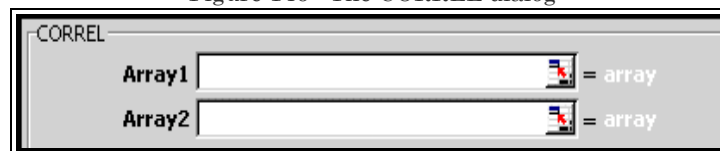
Activate cell J1. Select the option INSERT/FUNCTION. Choose the function category “Statistical.” In the list of functions that opens in the right half of the dialog, choose the function “CORREL” and execute the dialog by clicking on the button OK.

Figure 145: Choosing the function CORREL



The CORREL dialog (shown in the next figure) opens. The function needs two arrays (or series) of cells references. (Because the labels to both the text-box labels are bold, both text-boxes have to be filled for the function to be completely defined.) Therefore, the pointing to the cell references has to be done twice as shown in Figure 147 and the next two figures.

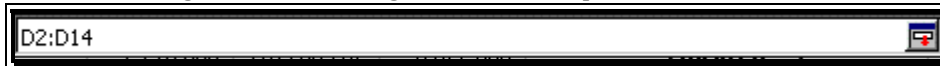
Figure 146: The CORREL dialog



Choosing the first array/series

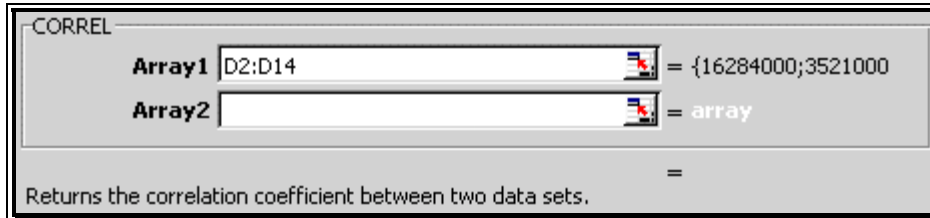
Click on the box edge of “Array1” (as shown in Figure 146.) Then go to the relevant data range (D2 to D14 in this example) and select it.

Figure 147: Selecting the first data input for the function



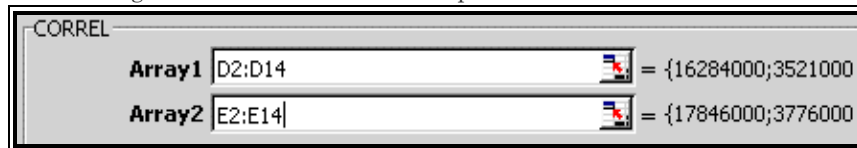
Repeat the same for “Array 2,” selecting the range “E2:E14” this time.

Figure 148: The first data input has been referenced



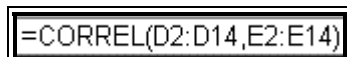
The formula is complete. The result is shown in the dialog in the area at the bottom “Formula result.” Execute the dialog by clicking on the button OK.

Figure 149: The second data input has also been referenced



Once the dialog closes, depress the ENTER key, and the function will be written into the cell and its result evaluated/calculated.

Figure 150: The function as written into the cell.

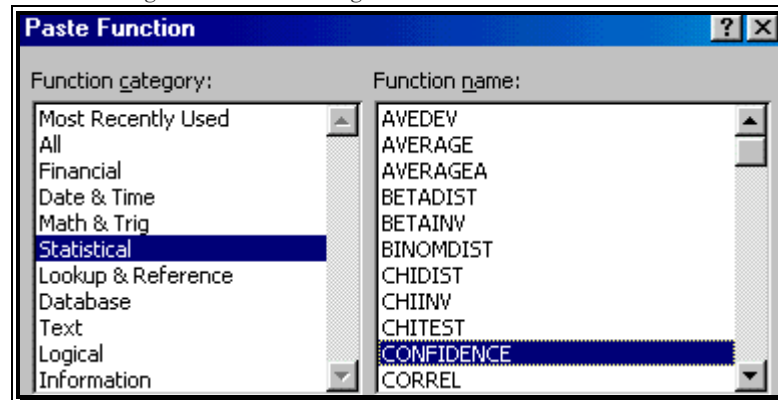


I use the example of the CONFIDENCE function from the category

“Statistical.” Choose the menu option INSERT/FUNCTION. Choose the function category “Statistical.”

In the list of functions that opens in the right half of the dialog, choose the function CONFIDENCE and execute the dialog by clicking on the button OK.

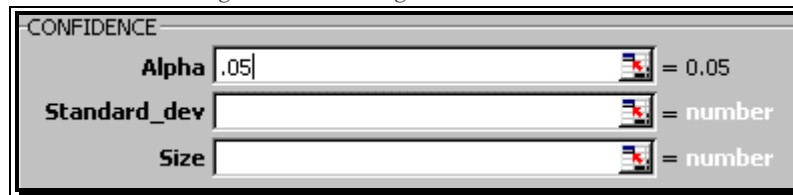
Figure 151: Selecting the CONFIDENCE function



The Confidence dialog (user-input form) requires²⁰ three parameters: the alpha, standard deviation, and sample size. First type in the alpha desired as shown in Figure 152. (An alpha of “.05” corresponds to a 95% confidence level while an alpha value of “:.1” corresponds to a confidence interval of 90 %.)

²⁰ We know that all three are necessary because their labels are in bold.

Figure 152: Dialog for CONFIDENCE



The CONFIDENCE dialog box has three input fields: Alpha (set to .05), Standard_dev (empty), and Size (empty). Each field has a small icon to its right. To the right of each field is a label: "= 0.05" for Alpha, "= number" for Standard_dev, and "= number" for Size.

Click on the OK button.

Figure 153: The first part of the function



The formula bar shows the text `=CONFIDENCE(.05)`.

Type a comma after the “.05” (see Figure 154) and then go to INSERT/FUNCTION and choose the formula STDEV as shown in Figure 155.

Figure 154: Placing a comma before entering the second part



The formula bar shows the text `(.05,)`.

Choose the range for which you want to calculate the STDEV (for example, the range “E:E”) and execute the dialog by clicking on the button OK.

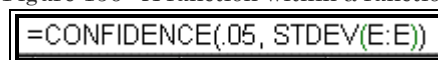
Figure 155: Using STDEV function for the second part of the function



The STDEV dialog box has two input fields: Number1 (set to E:E) and Number2 (empty). Each field has a small icon to its right. To the right of each field is a label: "= E:E" for Number1 and "= number" for Number2.

The formula now becomes:

Figure 156: A function within a function



The formula bar shows the text `=CONFIDENCE(.05, STDEV(E:E))`.

The main formula is still CONFIDENCE. The formula STDEV provides one of the parameters for this main formula. The STDEV function is nested within the CONFIDENCE function.

Type a comma, and then go to INSERT/FUNCTION and choose the function “Count” from the function category “Statistical” to get the final formula.

Figure 157: The completed formula

`=CONFIDENCE(0.05,STDEV(E:E),COUNT(E:E))`

There are two other ways to write this formula.

Select the option INSERT/FUNCTION, choose the function CONFIDENCE from the category “Statistical” and type in the formulae “STDEV(E:E)” and “COUNT(E:E)” as shown in Figure 158.

This method is much faster but requires that you know the function names STDEV and COUNT.

Figure 158: If sub-functions are required in the formula of a function, the sub-functions may be typed into the relevant text-box of the function’s dialog

CONFIDENCE		
Alpha	.05	= 0.05
Standard_dev	stdev(E:E)	= 10353405
Size	count(E:E)	= 235

The third way to write the formula is to type it in. This is the fastest method.

Figure 159: The result is the same

`=CONFIDENCE(0.05,STDEV(E:E),COUNT(E:E))`

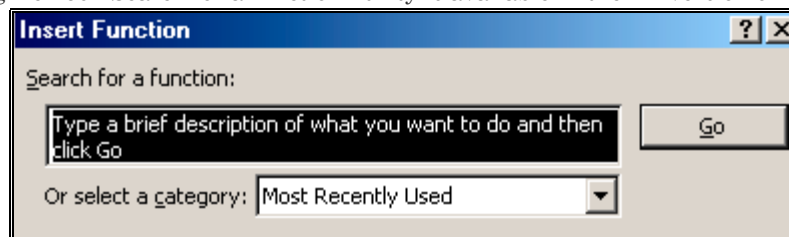
13.5

NEW FUNCTION-RELATED FEATURES IN THE XP VERSION OF EXCEL

Searching for a function

Type a question (like “estimate maximum value”) into the box “Search for a function” utility and click on the button “Go.” Excel will display a list of functions related to your query.

Figure 160: Search for a function utility is available in the XP version of Excel

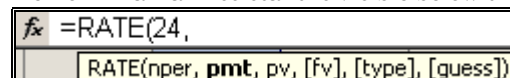


13.5.A

ENHANCED FORMULA BAR

After you enter a number or cell reference for the first function “argument” (or first “requirement”) and type in a comma, Excel automatically converts to bold format the next argument/requirement. In the example shown in the next figure, Excel makes bold the font for the argument placeholder *pmt* after you have entered a value for *nper* and a comma.

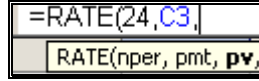
Figure 161: The Formula Bar Assistant is visible below the Formula Bar



Similarly, the argument/requirement after *pmt* has a bold font after you

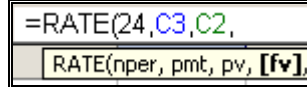
have entered a value or reference for the argument *pmt*

Figure 162: The next “expected” argument/requirement if highlighted using a bold font



The square brackets around the argument/requirement “fv” indicate that the argument is optional. You need not enter a value or reference for the argument.

Figure 163: An optional argument/requirement



13.5.B

ERROR CHECKING AND DEBUGGING

This topic is taught in chapter 19.

CHAPTER 14

TEXT FUNCTIONS

This chapter briefly discusses the following topics:

- COMPARING THE TEXT IN TWO CELLS
- EXACT
- CHANGING CASE OF TEXT
- UPPER, LOWER, PROPER
- REMOVING SPACES AND OTHER CHARACTERS FROM A STRING
- CLEAN, TRIM
- ENSURING THAT A NUMBER IS NOT MISREAD AS A TEXT STRING
- VALUE
- COMBINING STRINGS
- CONCATENATE
- A FUNCTION USED IN OTHER TEXT AND LOGICAL FUNCTIONS—THE LENGTH FUNCTION
- LEN
- OBTAINING PARSED PORTIONS OF A TEXT STRING
- MID, LEFT, RIGHT
- FINDING A TEXT STRING
- SEARCH, FIND

-
- REPLACING TEXT
 - REPLACE, SUBSTITUTE
-

14.1

COMPARING THE TEXT IN TWO CELLS

EXACT function

Compares two strings and outputs the result TRUE if the two strings are the same. The function needs a reference to two strings/cells.

The Function is case-sensitive, so EXACT("Test", test) = FALSE.
 Examples are in the worksheet "Exact" in the sample file "Text.xls."
 Additional samples will be available at
<http://www.vjbooks.net/excel/samples.htm>.

The function can be accessed through
 INSERT/FUNCTIONS/TEXT/EXACT.

Table 10: Examples for the comparison function EXACT

<i>String 1</i>	<i>String 2</i>	<i>Result</i>	
Noble	Noble	TRUE	
Noble	noble	FALSE	...because the "n" in the second cell is lower case unlike the upper case in the first cell
Noble	Nobel	FALSE	...because the spelling is different
123	432	FALSE	
123	123	TRUE	

<i>String 1</i>	<i>String 2</i>	<i>Result</i>	
Mary had a little lamb	mary had a little lamb	FALSE	...because the first “M” in the second cell is lower case unlike the upper case in the first cell
Mary had a little lamb	Mary had a little lamb	FALSE	...of the extra spaces after “Mary” in the second cell relative to the spaces after “Mary” in the first cell

14.2

CHANGING CASE OF TEXT

The functions listed in this section are accessible through INSERT/FUNCTIONS/TEXT. Examples are in the worksheet “Case” in the sample file “Text.xls.” Additional samples will be available at <http://www.vjbooks.net/excel/samples.htm>.

UPPER function

This function converts one string of text to uppercase. The function needs a reference to one cell.

LOWER function

This function converts one string of text to lowercase. The function needs a reference to one cell.

PROPER function

This function converts one string of text to proper case. The function

needs a reference to one cell.

Table 11: Examples of the case functions UPPER, LOWER, and PROPER

Text	<i>UPPER</i>	<i>LOWER</i>	<i>PROPER</i>
Mary had a little lamb	MARY HAD A LITTLE LAMB	mary had a little lamb	Mary Had A Little Lamb
INFORMATION FUNCTIONS	INFORMATION FUNCTIONS	information functions	Information Functions
Vijay Gupta	VIJAY GUPTA	vijay gupta	Vijay Gupta

14.3

REMOVING SPACES AND OTHER CHARACTERS FROM A STRING

The functions listed in this section are accessible through INSERT/FUNCTIONS/TEXT.

CLEAN function

This function removes all nonprintable characters from a text string. The function needs a reference to one cell.

TRIM function

This function removes all spaces from text except for single spaces between words. The function needs a reference to one cell. Examples are in the worksheet “Trim” in the sample file “Text.xls.” Additional samples will be available at <http://www.vjbooks.net/excel/samples.htm>.

Table 12: Examples of the TRIM function

<i>Text</i>	<i>TRIM</i>	
INFORMATION FUNCTIONS	INFORMATION FUNCTIONS	...the more-than-one spaces between the words are removed
n1**	n1**	...the space before “n1” is removed
Vijay Gupta	Vijay Gupta	...the spaces before “Vijay” and between “Vijay” and “Gupta” is removed

14.4

ENSURING THAT A NUMBER IS NOT MISREAD AS A TEXT STRING

VALUE

This function converts a 'text string that represents a number' to a 'number in numeric format,' converting incorrectly formatted as text column — if FORMAT/CELL/NUMBER does not work. The function needs a reference to one cell.

The function is accessible through INSERT/FUNCTIONS/TEXT/VALUE.

14.5

COMBINING STRINGS

CONCATENATE

This function combines several text strings into one text string.

The function can be accessed through
INSERT/FUNCTIONS/TEXT/CONCATENATE.

Example

Suppose C2 contains “234,000,” and D2 contains the year 1990.

CONCATENATE(“Labor force in country X was “, “C2”, in “the year”,
“D2”) = “Labor force in country X was 234,000 in 1990.” Examples are
in the worksheet “Combine” in the sample file “Text.xls”

14.6

A FUNCTION USED IN OTHER TEXT AND LOGICAL FUNCTIONS—THE LENGTH FUNCTION

LEN

The function LEN calculates the number of characters — including spaces - in a string. The function is a great aid as a nested function within other text functions. (Several text functions use information on length of a string or a sub-string within the main string.)

The function's menu location is INSERT/FUNCTIONS/TEXT/LEN.
Examples are in the worksheet “Length” in the sample file “Text.xls.”
Additional samples will be available at
<http://www.vjbooks.net/excel/samples.htm>.

OBTAINING PARSED PORTIONS OF A TEXT STRING

The functions listed in this section are accessible through INSERT/FUNCTIONS/TEXT. Examples are in the worksheet “Parsing” in the sample file “Text.xls.” Additional samples will be available at <http://www.vjbooks.net/excel/samples.htm>.

MID

This function extracts the text located at an user-defined starting and ending character position definition. The function extracts and outputs a number of characters (including spaces) from the middle of a string. The extraction is specified by two numbers — the character position at which to begin the extraction and the number of characters to be extracted.

MID(t1 or the text string from which characters are to be extracted, n1 or the starting position for extracting characters, n2 or the number of characters to be extracted)

LEFT

This function extracts the text located between — and including — the first character to an user-defined character position. The function extracts and outputs a number of characters (including spaces) from the left (starting-) of a string. One number specifies the extraction — “the number of characters to extract.”

LEFT(t1 or the text string from which characters are to be extracted, n2 or the number of characters to be extracted)

RIGHT

This function extracts the text located between — and including — the last character to an user-defined character position. The function extracts and outputs a number of characters (including spaces) from the (ending-) right of a string. One number specifies the extraction— “the number of characters to extract.”

RIGHT(t1 or the text string from which characters are to be extracted, n2 or the number of characters to be extracted)

Table 13: Examples of the parsing functions MID, LEFT, and RIGHT

<i>String</i>	<i>MID(string, 5, 3)</i>	<i>LEFT(string, 3)</i>	<i>RIGHT(string, 5)</i>
800 555 1212	555	800	1212
202 555 5555	555	202	5555

FINDING A TEXT STRING

The functions listed in this section are available through the menu path INSERT/FUNCTIONS/TEXT. Examples are in the worksheet “Find” in the sample file “Text.xls.”

Additional samples will be available at

<http://www.vjbooks.net/excel/samples.htm>.

SEARCH function

SEARCH(t1 or the string you want to find, t2 or the string that is to be searched for the occurrence of the string t1, character position within t2 at which you want to start searching for string t1)

The output is the character position at which the string t1 is first found in t2 (searching left to right).

Wildcards

You can use the wildcard characters, question-mark (?), and asterisk, in t1. A question-mark implies “any character” while an asterisk implies “any number/sequence of characters.” (If you want to find an actual question-mark or asterisk, type ~ before the character.)

SEARCH is not case sensitive and accepts wildcards.

FIND

FIND(t1 or the string you want to find, t2 or the string that is to be searched for the occurrence of the string t1, character position within t2 at which you want to start searching for string t1)

The output is the character position (a positive integer) at which the string t1 is first found in t2 (searching left to right).

This function is similar to the SEARCH function with two differences:

— FIND is case sensitive

— You cannot use wildcards in FIND

Table 14: Examples of the functions SEARCH and FIND

<i>String</i>	<i>Text to find</i>	<i>SEARCH</i>	<i>FIND</i>	<i>Rationale</i>
Mary had a little lamb	had	6	6	
INFORMATION FUNCTIONS	unc	14	#VALUE!	...because FIND is case-sensitive
INFORMATION FUNCTIONS	UNC	14	14	
The conductor conducted the orchestra	conductor*	5	#VALUE!	...because FIND does not perform wildcard searching

REPLACE

The REPLACE function replaces character at a location in a string with a user-chosen text string. The function is different from EDIT/FIND & REPLACE because the latter does not replace at a specific position. The function may be useful in macros/code, inside complex nested IF/CHOOSE functions, etc.

REPLACE(t1 or text within which text is to be replaced, character position of point in t1 where text is to be replaced, the number of characters to remove from t1, t2 or the text that will be insert in the

replacement on the positions previously occupied by the replaced text)

Any of the function arguments can be cell references.

Example:

Assume you want to replace “No.” with “Number” (or, equivalently, “o.” with “umber,” you may use the REPLACE function as shown below:

REPLACE(“Passport No. 123456”, 11, 2, “umber”) = “Passport Number 123456”

In this function

- “Passport No. 123456” is t1 or the text replaced
- 11 is character position of point in t1 where text is replaced.
The numbers add up as: 8 for the word “Passport” plus 1 for the space after the word “Passport” plus 1 for the next letter “N” plus 1 for the start of the replacement text “o.”
- 2 is the number of characters to remove from t1. These characters are in the string “o.”
- “umber” is t2 or the text that inserted as replacement

These functions are useful inside IF and other nested logical functions. Refer to chapter 18.

Examples are in the worksheet “Replace” in the sample file “Text.xls.” .

Table 15: Examples of the function REPLACE

<i>String</i>	<i>Starting point for insertion</i>	<i>Number of characters to remove from insertion point forward</i>	<i>Text to be inserted</i>	<i>REPLACE</i>
Passport No. 123456	11	2	umber	Passport Number 123456
Passport No. 123456	10	3	Number	Passport Number 123456
2025555555	4	0	-	202-5555555

SUBSTITUTE

SUBSTITUTE(t1 or text string, t2 or the text you want to replace, t3 or the text you want to insert in the replacement, and the optional parameter n1 which equals the instance number you want replaced of the t2 string).

If you omit n1 (the instance number you want replaced of the t2 string), all occurrences of the string t2 are replaced with the t3 string.

Example:

SUBSTITUTE("Washington DC, DC", "DC", "District of Columbia") =
"Washington District of Columbia, District of Columbia"

&

SUBSTITUTE("Washington DC, DC", "DC", "District of Columbia", 1)
= "Washington District of Columbia, DC"

&

SUBSTITUTE("Washington DC, DC", "DC", "District of Columbia", 2)
= "Washington DC, District of Columbia"

In these examples,

- "Washington DC, DC" is t1 or the text string, t2 or the text you want to replace, t3 or the text you want to insert in the replacement, and the optional parameter n1 which equals the instance number you want replaced of the t2 string)
- "DC" is t2 or the text you want to replace
- "District of Columbia" is t3 or the text you want to insert in the replacement
- The instance numbers for replacement are "All," "1" and "2" in the three examples, respectively.

SUBSTITUTE replaces specific text; REPLACE replaces text in a specific location.

Examples are in the worksheet "Substitute" in the sample file "Text.xls."

Additional samples will be available at
<http://www.vjbooks.net/excel/samples.htm>.

Table 16: Examples of the function SUBSTITUTE

<i>String</i>	<i>Text to be replaced</i>	<i>Text to be inserted</i>	<i>Instance</i>	<i>SUBSTITUTE</i>
Washington DC, DC	DC	District of Columbia	All	Washington District of Columbia, District of Columbia
Washington DC, DC	DC	District of Columbia	1	Washington District of Columbia, DC
Washington DC, DC	DC	District of Columbia	2	Washington DC, District of Columbia

CHAPTER 15

DATE AND TIME FUNCTIONS

This chapter teaches:

- CONVERTING A DATE TO A SERIAL NUMBER
- THE FUNCTIONS: NOW, TODAY, DATE, TIME, DATEVALUE, TIMEVALUE, WORKDAY
- CONVERSION OF SERIAL NUMBER TO DATE/DAY
- THE FUNCTIONS: SECOND, MINUTE, HOUR, WEEKDAY, DAY, MONTH, WEEKNUM

15.1

CONVERTING A DATE TO A SERIAL NUMBER

Table 17: Converting a date to a serial number

<i>Function</i>	<i>Location within menu INSERT/FUNCTION</i>	<i>Estimates the serial number for the date and/or time:</i>
NOW	DATE & TIME	Present Date And Time
TODAY	DATE & TIME	Today's Date
DATE	DATE & TIME	A User-Specified Date
TIME	DATE & TIME	A User-Specified Time
DATEVALUE	DATE & TIME	Date In Text Notation

<i>Function</i>	<i>Location within menu INSERT/FUNCTION</i>	<i>Estimates the serial number for the date and/or time:</i>
TIMEVALUE	DATE & TIME	Time In Text Notation
WORKDAY	DATE & TIME	Date In The Future or Past Based On User Chosen Number Of Workdays

Table 18: Examples of Date & Time functions. These are available on the sheet “date to serial” in the sample file “Date and Time.xls.”

<i>Function</i>					
NOW	37444.12772				
TODAY	37444.00				
	Input		Day	Month	Year
			7	4	2001
	Function	DATE	36988.00		
	Input		Hour	Minute	Second
			3	24	23
	Function	TIME	0.141932870		

The serial numbers can be changed to “date and time” by using FORMAT/CELL/NUMBER/DATE & TIME. After the reformatting, the sheet will resemble the one shown in the next table.

Table 19: Reformatting the serial numbers changes the function results into date and time. This table is from the sheet “date to serial reformatted” in the sample file “Date and Time.xls.”

<i>Function</i>					
NOW	7/7/02 3:03 AM				
TODAY	07-Jul-02				
	Input		Day	Month	Year
			7	4	2001
	Function	DATE	07-Apr-01		
	Input		Hour	Minute	Second
			3	24	23

	Function	TIME	3:24:23 AM
--	----------	------	------------

15.2

CONVERSION OF SERIAL NUMBER TO DATE & TIME

Table 20: Conversion of serial number to date/day

<i>Function</i>	<i>Location within menu INSERT/FUNCTION</i>	<i>Converts serial number to date and time. The result outputs the following:</i>
SECOND	DATE & TIME	Second
MINUTE	DATE & TIME	Minute
HOURL	DATE & TIME	Hour
WEEKDAY	DATE & TIME	Weekday (Monday, Tuesday, etc)
DAY	DATE & TIME	Day Of Month
MONTH	DATE & TIME	Month
WEEKNUM	DATE & TIME	Week Number During A Calendar Year (from weeks numbered 1 to 52)

Table 21: Examples of Date & Time functions.

These are available on the sheet “serial to date” in the sample file “Date and Time.xls.”

Serial Number (Input):	37444.126278	→ This input is referenced in the functions
<i>Function</i>	<i>Result</i>	<i>Explanation/Interpretation</i>
SECOND	50	i.e., 50 seconds after the minute
MINUTE	1	i.e., one minute after the hour
HOURL	3	i.e., 3 am
WEEKDAY	1	i.e., Sunday

Serial Number (Input):	37444.126278	→ This input is referenced in the functions
DAY	7	i.e., the 7th of the month
MONTH	7	i.e., July
WEEKNUM	28	i.e., the 28th week in the year

CHAPTER 16

MATHEMATICS, TRIGONOMETRY, DATABASE, AND ENGINEERING FUNCTIONS

This chapter briefly shows:

- ROUNDING OFF/TRUNCATING DECIMALS
- EVEN, ODD, CEILING, FLOOR, ROUND, ROUNDDOWN, ROUNDUP, INT, TRUNC
- FACTORIALS, MULTINOMIAL, PERMUTATIONS, AND COMBINATIONS
- TRIGONOMETRY FUNCTIONS
- TAN, TANH, SIN, SINH, ACOS, ACOSH, ASIN, ASINH, ATAN, ATAN2, ATANH, COS, COSH
- DATABASE FUNCTIONS
- STATISTICS CONDUCTED DIRECTLY ONTO A DATABASE

The “Counting and Summing” mathematical functions, transformation functions (like “Log Natural” and “Absolute Number”), functions that estimate deviations from the mean are taught in *Volume 5: Statistical Analysis with Excel*.

16.1

ROUNDING OFF/TRUNCATING DECIMALS

All functions shown in this section are in INSERT/FUNCTION/MATH.

16.1.A

ROUNDING UP TO THE NEXT HIGHEST (IN ABSOLUTE TERMS) EVEN OR ODD INTEGER

Table 22: Rounding up to the next highest (in absolute terms) even or odd integer

<i>Function</i>	<i>Method of rounding</i>	<i>Examples using positive values</i>	<i>Examples using negative values</i>
EVEN	This function rounds the number to the nearest even integer. (This is in absolute terms; so “-221.1” is rounded up to “-222” which is higher in absolute terms.	EVEN (110.21) = 112 EVEN (11.4) = 112 EVEN (11.6) = 112	EVEN (-1) = -2 EVEN (-221.1) = -222
ODD	This function rounds up to the nearest odd integer.	ODD (110.21) = 111 ODD (111.4) = 113 ODD (111.6) = 113	ODD (-1) = -1 ODD (-221.1) = -223

16.1.B

ROUNDING UP OR DOWN TO THE NEXT MULTIPLE OF SIGNIFICANCE (THAT IS, TO A MULTIPLE OF, FOR EXAMPLE, 0.05)

Table 23: Rounding up or down to the next multiple of significance (that is, to a multiple of, for example, 0.05)

<i>Function</i>	<i>Method of rounding</i>	<i>Examples using positive values</i>	<i>Examples using negative values</i>
CEILING	Returns number rounded up, away from zero, to the nearest multiple of significance. For example, if you want to avoid using pennies in your prices and your product is priced at \$4.42, use the formula =	CEILING (110.21, 0.1) = 110.3 CEILING (111.4, 0.25) = 111.5 CEILING (111.6, 0.1) = 111.6 CEILING (111.6, 0.25) = 111.75 CEILING (111.6, 1) = 112 CEILING (111.6, -1) = 120 CEILING (111.6, -2) = 200	CEILING (-221.1, -2) = -222 CEILING (-221.1, -4) = -224 CEILING (-2.5, 2) = #NUM! (Because negative 2.5 is not a multiple of 2)

Function	Method of rounding	Examples using positive values	Examples using negative values
	CEILING (4.42, 0.05) to round prices up to the nearest nickel.		
FLOOR	Obverse of CEILING— this function rounds down, to the nearest multiple of significance.	FLOOR (110.21, 0.1) = 110.2 FLOOR (111.4, 0.25) = 111.25 FLOOR (111.6, 0.1) = 111.6 FLOOR (111.6, 0.25) = 111.25 FLOOR (111.6, 1) = 111 FLOOR (111.6, -1) = 110 FLOOR (111.6, -2) = 100	FLOOR (-221.1, -2) = -220 FLOOR (-221.1, -4) = -220 FLOOR (-2.5, 2) = #NUM! (Because negative 2.5 is not a multiple of 2)

16.1.C

ROUNDING UP TO SPECIFIED NUMBER OF DIGITS

Table 24: Rounding to specified number of digits

Function	Method of rounding	Examples using positive values	Examples using negative values
ROUND	This function does not round up or down. Just changes the number of decimals displayed to a specified number of digits. This function is useful as an extra layer over your functions— to ensure results maintain the number of decimal points you desire.	ROUND (110.21, 2) = 110.21 ROUND (110.21, 1) = 110.2 ROUND (110.21, 0) = 110 ROUND (110.21, -1) = 100	ROUND (-1, 1) = -1.0 ROUND (-221.1, 0) = -221

<i>Function</i>	<i>Method of rounding</i>	<i>Examples using positive values</i>	<i>Examples using negative values</i>
ROUNDDOWN	This function rounds a number down towards zero.	ROUNDDOWN (110.21, 2) = 110.21 ROUNDDOWN (110.21, 1) = 110.2 ROUNDDOWN (110.21, 0) = 110 ROUNDDOWN (110.21, -1) = 100	ROUNDDOWN (-1, 1) = -1.0 ROUNDDOWN (-221.1, 0) = -221
ROUNDUP	This function rounds a number up towards zero.	ROUNDUP (110.21, 2) = 110.21 ROUNDUP (110.21, 1) = 111 ROUNDUP (110.21, 0) = 111 ROUNDUP (110.21, -1) = 200	ROUNDUP (-1, 1) = -1.0 ROUNDUP (-221.1, 0) = -221

16.1.D

ROUNDING OFF TO AN INTEGER

Table 25: Rounding-off to an integer

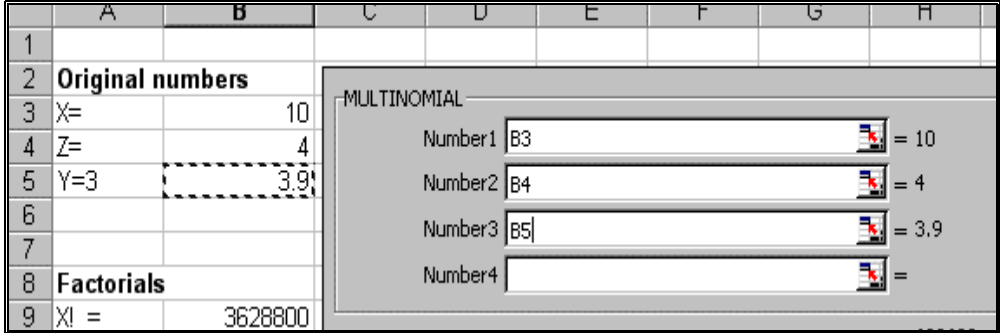
<i>Function</i>	<i>Method of rounding</i>	<i>Examples using positive values</i>	<i>Examples using negative values</i>
INT	This function rounds a number down to the nearest integer. (If a negative number, then the rounding direction is “away from zero.”)	INT (110.21) = 110 INT (111.4) = 111 INT (111.6) = 111	INT (-221.1) = -222 INT (-114.2) = -115
TRUNC	This function truncates a number to an integer by removing the fractional part of the number. (<i>The function has no up or down directional bias.</i>) <i>INT</i> and <i>TRUNC</i> are different only when using negative numbers	TRUNC (110.21) = 110 TRUNC (111.4) = 111 TRUNC (111.6) = 111	INT (-221.1) = -221 INT (-114.2) = -114

16.1.E

FACTORIALS, PERMUTATIONS AND COMBINATIONS

Table 26: Factorials and permutations. Samples will be available at
<http://www.vjbooks.net/excel/samples.htm>.

Function	Description	Location within INSERT/FUNCTION	Data Requirements
Factorials and double factorials	The factorial of a positive integer X is equal to $1*2*3*...*X$. The double factorial (rarely used) equals $2*4*6*...*(X-2)*X$ if X is even, and $1*3*5*...*(X-2)*X$ if X is an odd integer.	MATH /FACT & MATH /FACTDOUBLE	A positive integer. If X is not an integer, Excel truncates it implicitly and uses the truncated integer formed by the removal of decimal points. (For example, if X = 110.21, it is truncated to X = 110.)
Multinomial	Calculates the ratio of the “sum of two factorials” to the “product of two factorials” For two numbers, X and Z, the multinomial is: $\frac{\text{factorial}(X) + \text{factorial}(Z)}{\text{factorial}(X) * \text{factorial}(Z)}$ You can also use this function for more than two numbers.	MATH /MULTINOMIAL	Two or more positive integers. If any of the numbers is not an integer, Excel truncates it implicitly and uses the truncated integer formed by the removal of decimal points. (So, for example, if X = 110.21, it is truncated to X = 110.) You can also use this function for more than two numbers.

Function	Description	Location within <i>INSERT/FUNCTION</i>	Data Requirements
Figure 164: The MULTINOMIAL function 			
Permutation	A permutation is any set or subset of objects or events where internal order is significant.	MATH /PERMUT	The function requires two numbers. In the text-box “Number,” enter the number of objects or a cell reference to the number. In the text-box “Number chosen,” enter the number of objects in each permutation or a cell reference to the number. Number chosen must be a lower value than Number. Both have to be positive integers.

Function	Description	Location within <i>INSERT/FUNCTION</i>	Data Requirements				
Figure 165: The PERMUT function							
	A	B	C	D	E	F	G
1	Number of cards	52					
2	Number of cards chosen	4					
3							
4	Total number of combinations	270725					
5	Total number of permutations	PERMUT Number B1 = 52 Number_chosen B2 = 4					
6							
7							
8							
9							

Combinations

This function calculates the maximum number of groups for X number of items, if you choose Y items each time. A combination is any set or subset of items, regardless of their internal order. Combinations are distinct from permutations, for which the internal order is significant. For example, “(a, b, c), (a, c, b), (c, a, b), (c, b, a), (b, c, a) and (b, a, c)” count as one combination and six permutations of this one combination.

Menu path to function: INSERT/FUNCTION/MATH/COMBIN. Data requirements: The function requires two numbers. In the text-box Number, enter the number of objects or a cell reference to the number. In the text-box Number chosen, enter the number of objects in each combination or a cell reference to the number. Number chosen must be a lower value than Number. Both have to be positive integers.

Figure 166: The COMBIN function

	A	B	C	D	E	F	G
1	Number of cards	52					
2	Number of cards chosen	4					
3							
4	Total number of combination	COMBIN Number B1 = 52 Number_chosen B2 = 4					
5	Total number of permutations						
6							
7							
8							

16.1.F

TRIGONOMETRY FUNCTIONS

Excel has several trigonometric functions. A discussion of these functions is beyond the scope of this book. I simply list the functions below.

Table 27: Trigonometry functions

<i>Function</i>	<i>Location within menu INSERT/FUNCTION</i>	<i>Estimates</i>
TAN	MATH & TRIG	Tangent
TANH	MATH & TRIG	Hyperbolic Tangent
SIN	MATH & TRIG	Sine Of Angle
SINH	MATH & TRIG	Hyperbolic Sine
ACOS	MATH & TRIG	Arccosine
ACOSH	MATH & TRIG	Inverse Hyperbolic Cosine
ASIN	MATH & TRIG	Arcsine
ASINH	MATH & TRIG	Inverse Hyperbolic Sine
ATAN	MATH & TRIG	Arctangent
ATAN2	MATH & TRIG	Arctangent for (X, Y) Pair
ATANH	MATH & TRIG	Inverse Hyperbolic

<i>Function</i>	<i>Location within menu INSERT/FUNCTION</i>	<i>Estimates</i>
		Tangent
COS	MATH & TRIG	Cosine
COSH	MATH & TRIG	Hyperbolic Cosine
DEGREES	MATH & TRIG	Conversion of angle measure from Radians to Degrees

Table 28: Examples of trigonometric functions from the sheet “trigonometry” in the sample file “Trigonometric.xls.” The DEGREE function converts the output (in Radians) into Degrees.

		Input used in function	Result	
<i>Function</i>			In Radians	In Degrees
COS	Radians	1.1	0.45	25.99
SIN	Radians	1.1	0.89	51.06
TAN	Radians	1.1	1.96	112.57
<i>Hyperbolic Functions</i>			Number	
COSH	Real Number	2	3.76	
SINH	Real Number	2	3.63	
TANH	Real Number	2	0.96	
<i>Inverse Hyperbolic Functions</i>			Number	
ACOSH	Real Number greater than 1	2	1.32	
ASINH	Real Number	-0.5	-0.48	
ATANH	Real Number between -1 and 1	-0.5	-0.55	
<i>Inverse Functions</i>			In Radians	In Degrees

		Input used in function	Result	
<i>Function</i>			In Radians	In Degrees
COS	Radians	1.1	0.45	25.99
SIN	Radians	1.1	0.89	51.06
TAN	Radians	1.1	1.96	112.57
<i>Hyperbolic Functions</i>			Number	
COSH	Real Number	2	3.76	
SINH	Real Number	2	3.63	
TANH	Real Number	2	0.96	
<i>Inverse Hyperbolic Functions</i>			Number	
ACOSH	Real Number greater than 1	2	1.32	
ASINH	Real Number	-0.5	-0.48	
ATANH	Real Number between -1 and 1	-0.5	-0.55	
ACOS	Number (the Cosine) between -1 and 1	-0.5	2.09	120
ASIN	Number (the Sine) between -1 and 1	-0.5	-0.52	-30
ATAN	Number (the Tangent)	-0.5	-0.46	-26.57

STATISTICS CONDUCTED DIRECTLY ONTO A DATABASE

The following functions (available through the menu option INSERT/FUNCTION/DATABASE) perform similar operations as the

functions without the “D” prefix. For example, DAVERAGE performs the same operation as AVERAGE.

DAVERAGE, DCOUNT, DCOUNTA, DMAX, DMIN, DPRODUCT, DSTDEV, DSTDEVP, DSUM, DVAR, DVARP.

Please read *Volume 4: Managing & Tabulating Data in Excel* (on database access through Excel) before using these functions. Discussion of these functions is beyond the scope of this book.

16.3

**ENGINEERING FUNCTIONS (CONVERTING
BETWEEN DATA STORAGE FORMATS. AND
WORKING WITH COMPLEX NUMBERS)**

The following functions (available through the menu option INSERT/FUNCTION/ENGINEERING) are beyond the scope of this book: BESSELI, BESSELJ, BESSELK, ERF, ERF, and GESTEP. The next sub-section lists other engineering functions.

16.3.A

CONVERSION ACROSS NUMBER TYPES

Excel has several functions for converting between number types like Binary, Hexadecimal, and Octal. A discussion of these functions is beyond the scope of this book. I simply list the functions below.

Table 29: Number Type Conversion

<i>Function</i>	<i>Location within INSERT/FUNCTION</i>	<i>From Type ...</i>	<i>... To Type</i>
-----------------	--	----------------------	--------------------

<i>Function</i>	<i>Location within INSERT/FUNCTION</i>	<i>From Type ...</i>	<i>... To Type</i>
OCT2BIN	ENGINEERING	Octal	Binary
OCT2DEC	ENGINEERING	Octal	Decimal
OCT2HEX	ENGINEERING	Octal	Hexadecimal
BIN2DEC	ENGINEERING	Binary	Decimal
BIN2HEX	ENGINEERING	Binary	Hexadecimal
BIN2OCT	ENGINEERING	Binary	Octal
DEC2BIN	ENGINEERING	Decimal	Binary
DEC2HEX	ENGINEERING	Decimal	Hexadecimal
DEC2OCT	ENGINEERING	Decimal	Octal
HEX2BIN	ENGINEERING	Hexadecimal	Binary
HEX2DEC	ENGINEERING	Hexadecimal	Decimal
HEX2OCT	ENGINEERING	Hexadecimal	Octal
RADIANS	MATH & TRIG	Degrees	Radians
DEGREES	MATH & TRIG	Radians	Degrees
ROMAN	MATH & TRIG	Arabic Notation	Roman Notation

16.3.B

OTHER CONVERSION FUNCTIONS

Table 30: Other Conversion functions

<i>Function</i>	<i>Location</i>	<i>Converts</i>	<i>... To</i>
CONVERT	ENGINEERING	A Measurement System	Different Measurement System
DELTA	ENGINEERING	Across number types, this function assesses if two values are equal	

16.4

COMPLEX NUMBERS

Excel has several functions for working with complex numbers. A discussion of these functions is beyond the scope of this book. I simply list the functions below.

16.4.A

COMPLEX NUMBER TRANSFORMATIONS

Table 31: Complex Number Transformations. Except for IMLOG2, these functions can be broken into the prefix “IM” and the equivalent function for real numbers

<i>Function</i>	<i>Location within menu INSERT/FUNCTION</i>	<i>Transformation Applied</i>
IMABS	ENGINEERING	Absolute Value Or Modulus
IMCOS	ENGINEERING	Cosine
IMEXP	ENGINEERING	Exponential
IMLN	ENGINEERING	Natural Log (Base=e)
IMLOG10	ENGINEERING	Log to the Base 10
IMLOG2	ENGINEERING	Log to the Base 2
IMSIN	ENGINEERING	Sine
IMSQRT	ENGINEERING	Square Root

16.4.B

PARAMETERS OF A COMPLEX NUMBER

Table 32: Parameters of a complex number

<i>Function</i>	<i>Location within menu INSERT/FUNCTION</i>	<i>Parameter Returned By Function...</i>
IMAGINARY	ENGINEERING	Imaginary Coefficient

<i>Function</i>	<i>Location within menu INSERT/FUNCTION</i>	<i>Parameter Returned By Function...</i>
IMARGUMENT	ENGINEERING	Angle In Radians
IMCONJUGATE	ENGINEERING	Complex Conjugate
IMREAL	ENGINEERING	Real Coefficient
COMPLEX	ENGINEERING	Real And Imaginary Coefficients

16.4.C

OPERATIONS WITH GREATER THAN ONE COMPLEX NUMBER

Table 33: Operations with greater than one complex number. Except for IMSUB, these functions can be broken into the prefix “IM” and the equivalent function for real numbers.

<i>Function</i>	<i>Location within menu INSERT/FUNCTION</i>	<i>Algebraic Operation</i>
IMPRODUCT	ENGINEERING	Multiplication
IMDIV	ENGINEERING	Division
IMSUB	ENGINEERING	Subtraction
IMSUM	ENGINEERING	Addition

CHAPTER 17

LOGICAL & INFORMATION FUNCTIONS

This chapter teaches the following topics:

- NEGATIVE NESTING (THE NOT FUNCTION)
- FUNCTIONS THAT OUTPUT TRUE/FALSE AFTER
EVALUATING IF ALL/ONE/NONE OF THE LOGICAL
EXPRESSIONS ARE TRUE
- AND, OR, NOT(AND), NOT(OR)
- INFORMATION FUNCTIONS ON TYPE OF DATA IN CELL (IS
FUNCTIONS)
- ISBLANK, NOT(ISBLANK), ISLOGICAL, NOT(ISLOGICAL),
ISNUMBER, NOT(ISNUMBER), ISTEXT, ISNONTEXT,
NOT(ISTEXT), ISREF, NOT(ISREF)
- TYPE FUNCTION PROVIDES INFORMATION ON THE DATA
TYPE OF THE VALUE IN A CELL
- TESTING IF ODD OR EVEN NUMBER
- ISODD, — ISEVEN
- INFORMATION ON ERROR TYPE IN A CELL (#N/A, #VALUE!,
#REF!, #DIV/0!, #NUM!, #NAME?, #NULL!)
- ISERR, NOT(ISERR), ISNA, NOT(ISNA), ISERROR,
NOT(ISERROR),
- ERROR.TYPE FUNCTION PROVIDES INFORMATION ON THE

ERROR TYPE — IF ANY - IN A CELL

17.1

NEGATIVE NESTING (THE NOT FUNCTION)

The NOT function switches a TRUE to FALSE and vice versa.

NOT(FALSE) = TRUE

NOT(10+1=11) gives the result FALSE, because the expression is TRUE. Examples are in the worksheet “Logical and, or, not” in the sample file “Logical and Information.xls.” Additional samples will be available at <http://www.vjbooks.net/excel/samples.htm>.

As you will see in the next sections, the NOT function can be extremely powerful when combined with other logical/information functions. In effect, the combination is a new and unique logical function.

The function is useful inside IF and other nested logical functions. Refer to chapter 18.

17.2

FUNCTIONS THAT OUTPUT TRUE/FALSE AFTER EVALUATING IF ALL/ONE/NONE OF THE LOGICAL EXPRESSIONS ARE TRUE (THE FUNCTIONS— AND, OR)

17.2.A

AND FUNCTION

The function tests for “ALL EXPRESSIONS ARE TRUE“

The function can have many logical expressions/arguments, each separated by a comma. If –and only if - **all** the logical expressions/arguments are true, the function result is TRUE.

If **even one** of the logical expressions/arguments is not true, the function result is FALSE.

Location within INSERT / FUNCTION: LOGICAL/AND

Data Requirements: One or more logical expressions. A comma separates each expression.

AND(expression 1, expression 2,, expression k)
--

Examples:

- AND(TRUE, FALSE) = FALSE
(because one of the logical expressions is not equal to TRUE)
- AND(10+1=11, 10*1=1, 10-2=8, 10<100) = TRUE

(because all four expressions are TRUE)

but,

AND(10+1=11, 10*1=10, 10-2=12, 10<100) = FALSE
(because the third expression is FALSE while the other expressions are true)

17.2.B

OR FUNCTION

The function tests for “EVEN IF ONE EXPRESSION IS TRUE”

The function can have many logical expressions/arguments, each separated by a comma. If **even one** of the logical expressions/arguments is TRUE, then the function result is TRUE.

If –and only if - **all** of the logical expressions/arguments are FALSE, the function result is FALSE.

Location within INSERT / FUNCTION: LOGICAL/OR

Data Requirements: One or more logical expressions. A comma separates each expression.

OR(expression 1, expression 2,, expression k)

Examples:

- OR(TRUE, FALSE) = TRUE
(because one of the logical expressions is TRUE)

-
- $\text{OR}(10+1=11, 10*1=11, 10-2=8, 10<100) = \text{TRUE}$
(because all four expressions are TRUE)

and,

$\text{OR}(10+1=11, 10*1=10, 10-2=12, 10<100) = \text{TRUE}$
(because at least one expression is TRUE)

17.2.C

NOT(AND) FUNCTION

The function tests for “EVEN IF ONE IS TRUE“

It provides the same test for FALSE expressions as the function AND does for TRUE expressions. If **even one** of the logical expressions/arguments is FALSE, then the function result is TRUE.

If –and only if - **all** of the logical expressions/arguments are TRUE the function result is FALSE.

Location within INSERT / FUNCTION: LOGICAL/AND, &
LOGICAL/NOT

Data Requirements: One or more logical expressions. A comma separates each expression.

$\text{NOT}(\text{AND}(\text{expression 1}, \dots, \text{expression k}))$

Examples:

- $\text{NOT}(\text{AND}(\text{TRUE}, \text{FALSE})) = \text{TRUE}$
(because one of the expressions is FALSE)

- NOT (AND(10+1=11, 10*1=10, 10-2=8, 10<100)) = FALSE
(because none of the expressions are FALSE. They are all TRUE)

and,

NOT (AND(10+1=11, 10*1=10, 10-2=12, 10<100)) = TRUE
(because at least one expression –the third expression in this example -is FALSE)

but,

NOT (AND(10+1=1, 10*1=1, 10-2=1, 10<1))= TRUE
(because at least one expression is FALSE)

17.2.D

NOT(OR) FUNCTION

The function tests for “ALL FALSE“

It provides the same test for FALSE expressions as the function AND does for TRUE expressions. If –and only if - **all** the logical expressions/arguments are FALSE, then the function result is TRUE.

If **even one** of the logical expressions/arguments is TRUE, the function result is FALSE.

Location within INSERT / FUNCTION: LOGICAL/OR, & LOGICAL/NOT

Data Requirements: One or more logical expressions. A comma separates each expression.

NOT (OR(expression 1,, expression k))

Examples:

- NOT (OR(TRUE, FALSE)) = FALSE
(because one of the expressions is TRUE)

- NOT (OR(10+1=11, 10*1=10, 10-2=8, 10<100)) = FALSE
(because all four expressions are TRUE)

and,

NOT (OR(10+1=11, 10*1=10, 10-2=12, 10<100)) = FALSE
(because at least one expression is TRUE)

but,

- NOT (OR(10+1=1, 10*1=1, 10-2=1, 10<1))= TRUE
(because all the expressions are FALSE)

The functions are useful inside IF and other nested logical functions.
Refer to chapter 18.

Table 34: Examples of the logical functions AND, OR, and NOT. Examples are in the worksheet “Logical and, or, not” in the sample file “Logical and Information.xls.” Additional samples will be available at <http://www.vjbooks.net/excel/samples.htm>.

<i>Function</i>	<i>Result</i>
<i>AND</i>	
AND(TRUE, FALSE)	FALSE
AND(10+1=11, 10*1=10, 10-2=8, 10<100)	TRUE
AND(10+1=11, 10*1=10, 10-2=12, 10<100)	FALSE

<i>Function</i>	<i>Result</i>
<i>OR</i>	
OR(TRUE, FALSE)	TRUE
OR(10+1=11, 10*1=10, 10-2=12, 10<100)	TRUE
<i>NOT (AND)</i>	
NOT (AND(TRUE, FALSE))	TRUE
NOT (AND(10+1=11, 10*1=10, 10-2=8, 10<100))	FALSE
NOT (AND(10+1=11, 10*1=10, 10-2=12, 10<100))	TRUE
NOT (AND(10+1=1, 10*1=1, 10-2=1, 10<1))	TRUE
<i>NOT (OR)</i>	
NOT (OR(TRUE, FALSE))	FALSE
NOT (OR(10+1=11, 10*1=10, 10-2=8, 10<100))	FALSE
NOT (OR(10+1=11, 10*1=10, 10-2=12, 10<100))	FALSE
NOT (OR(10+1=1, 10*1=1, 10-2=1, 10<1))	TRUE

INFORMATION FUNCTIONS ON TYPE OF DATA IN CELL (IS FUNCTIONS)

The following “IS” functions are used to test if a value or the result of a function in a referenced cell conforms (or, does not conform, if one adds the NOT function to the IS function) to a certain data type.

The functions are used as, for example,

ISBLANK(Reference to a Cell),

or

NOT(ISBLANK(Reference to a Cell))

Table 35: The “IS” information functions. Examples are in the worksheet “IS” information functions’ in the sample file “Logical and Information.xls.”

<i>Function</i>	<i>The formula result = TRUE if...</i>	<i>Location within INSERT/FUNCTION</i>	<i>Data Requirements</i>
ISBLANK	The referenced cell is empty.	INFORMATION/ISBLANK	One referenced cell.
NOT(ISBLANK)	The referenced cell is not empty	INFORMATION/ISBLANK & LOGICAL/NOT	One referenced cell.
ISLOGICAL	The referenced cell’s value is TRUE or FALSE.	INFORMATION/ISLOGICAL	One referenced cell.
NOT(ISLOGICAL)	The referenced cell’s value is <u>neither</u> TRUE nor FALSE.	INFORMATION/ISLOGICAL & LOGICAL/NOT	One referenced cell.
ISNUMBER	The referenced cell’s value is a number.	INFORMATION/ISNUMBER	One referenced cell.
NOT(ISNUMBER)	The referenced cell’s value is not a number.	INFORMATION/ISNUMBER & LOGICAL/NOT	One referenced cell.
ISTEXT	The referenced cell’s value is a text string.	INFORMATION/ISTEXT	One referenced cell.
ISNONTEXT	The referenced cell’s value is not a text string or is blank.	INFORMATION/ISNONTEXT	One referenced cell.
NOT(ISTEXT)	The referenced cell’s	INFORMATION/ISTEXT	One referenced

<i>Function</i>	<i>The formula result = TRUE if...</i>	<i>Location within INSERT/FUNCTION</i>	<i>Data Requirements</i>
	value is not a text string.	& LOGICAL/NOT	cell.
ISREF	The referenced cell's value is a reference to a range.	INFORMATION/ISREF	One referenced cell.
NOT(ISREF)	The referenced cell's value is not a reference to a range.	INFORMATION/ISREF & LOGICAL/NOT	One referenced cell.

The functions are useful inside IF and other nested logical functions.
Refer to chapter 18.

17.3.A TYPE FUNCTION PROVIDES INFORMATION ON THE DATA TYPE OF THE VALUE IN A CELL

The TYPE function may be used in nested logical functions like AND, OR, NOT, IF and CHOOSE. The function TYPE gives as result the numbers shown in the right column of the table below.

The function is: TYPE(Reference to a Cell)

Table 36: Mapping of the output of the function TYPE and specific data types. Examples are in the worksheet "IS" information functions' in the sample file "Logical and Information.xls."

<i>If the referenced cell's value is</i>	<i>The result of the TYPE function is:</i>
Number	1
Text	2
Logical value	4

<i>If the referenced cell's value is</i>	<i>The result of the TYPE function is:</i>
Error value	16
Array	64

The function is useful inside IF, CHOOSE and other nested or logical functions. Refer to chapter 18 starting on page 226.

Table 37: Examples of the IS functions. Examples are in the worksheet “IS” information functions’ in the sample file “Logical and Information.xls.”

<i>Test Values→</i>	<i>10</i>	<i>TEST</i>		<i>#VALUE!</i>	<i>TRUE</i>	<i>235</i>	<i>TRIAL 1</i>
ISBLANK	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
NOT(ISBLANK)	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE
ISLOGICAL	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	FALSE
NOT(ISLOGICAL)	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE
ISNUMBER	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE
NOT(ISNUMBER)	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
ISTEXT	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE
ISNONTEXT	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE
NOT(ISTEXT)	TRUE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE
TYPE	1	2	1	16	4	1	2

ISODD function

Outputs TRUE if the referenced value is an Odd number.

Location within INSERT / FUNCTION: INFORMATION/ISODD

Data Requirements: One Integer. (Non-integers are truncated by Excel)

Examples:

- ISODD(-1) = TRUE
- ISODD(1) = TRUE
- ISODD(2) = FALSE
- ISODD(2.5) = FALSE, because the number “2.5” is truncated to 2.

ISEVEN function

Outputs TRUE if the referenced value is an Even number.

Location within INSERT / FUNCTION: INFORMATION/ISEVEN

Data Requirements: One Integer. (Non-integers are truncated by Excel)

Examples:

- ISEVEN(-1) = FALSE
- ISEVEN(1) = FALSE
- ISEVEN(2) = TRUE
- ISEVEN(2.5) = TRUE, because the number “2.5” is truncated to 2.

17.5

**INFORMATION ON ERROR TYPE IN A CELL (#N/A,
#VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?,
#NULL!)**

The functions are used as, for example,

ISERR(Reference to a Cell) or NOT(ISERR(Reference to a Cell))

Table 38: The “IS Error” information functions. Examples are in the worksheet “Errors” in the sample file “Logical and Information.xls.”

Function	<i>The formula result=TRUE if...</i>	<i>Location within INSERT/FUNCTION</i>	<i>Data Requirements</i>
ISERR	The referenced cell's value is any error value except #N/A. These error values are— #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?, #NULL!.	INFORMATION/ISERR	One referenced cell.
NOT(ISERR)	The referenced cell's value is <u>not</u> any of the following error values: #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?, #NULL!.	INFORMATION/ISERR & LOGICAL/NOT	One referenced cell.
ISNA	The referenced cell's value is the #N/A (not available) error value.	INFORMATION/ISNA	One referenced cell.
NOT(ISNA)	The referenced cell's value is the <u>not</u> equal to the #N/A (not available) error value.	INFORMATION/ISNA & LOGICAL/NOT	One referenced cell.
ISERROR	The referenced cell's value is any error value. The error values are— #N/A, #VALUE!, #REF!, #DIV/0!,	INFORMATION/ISERROR	One referenced cell.

Function	<i>The formula result=TRUE if...</i>	<i>Location within INSERT/FUNCTION</i>	<i>Data Requirements</i>
	#NUM!, #NAME?, #NULL!.		
NOT(ISERROR)	The referenced cell's value is <u>not</u> any error value. The error values are— #N/A, #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?, #NULL!.	INFORMATION/ISERROR & LOGICAL/NOT	One referenced cell.
N	Converts the information in the referenced cell into its numeric equivalent. Excel evaluates the logical values TRUE & FALSE as 1 and 0, respectively. A date is converted into a serial number. (A serial number can represent each date. On reformatting (or using one of the "Serial number to date" functions), the serial number will show as dates. Excel evaluates a Text string as zero. Errors retain their error value.	INFORMATION/N	One referenced cell

17.5.A ERROR.TYPE FUNCTION PROVIDES INFORMATION ON THE ERROR TYPE — IF ANY - IN A CELL

The function is used as, for example:

ERROR.TYPE (Reference to a Cell)

This function is often used in an IF or CHOOSE function.

Table 39: Mapping of the output of the function `ERROR.TYPE` and specific Error values. Examples are in the worksheet “Errors” in the sample file “Logical and Information.xls.”

<i>If the value is...</i>	<i>Then the <code>ERROR.TYPE</code> result is:</i>
NULL!	1
DIV/0!	2
VALUE!	3
REF!	4
NAME?	5
NUM!	6
N/A	7
No error	#N/A

The function is useful inside IF, CHOOSE and other nested OR logical functions. Refer to chapter 18. Note: you can color code cells whose values have error terms using “Conditional Formatting.” This topic is taught in *Volume 1: Excel For Beginners & Volume 4: Managing & Tabulating Data in Excel*.

Table 40: Examples of the IS (ERROR) functions

<i>Formula or cell value</i>	<i>ISNA</i>	<i>NOT(ISNA)</i>	<i>ISERROR</i>	<i>NOT(ISERROR)</i>	<i>ERROR.TYPE</i>
VALUE!	FALSE	TRUE	TRUE	FALSE	3
NAME?	FALSE	TRUE	TRUE	FALSE	5
REF!	FALSE	TRUE	TRUE	FALSE	4
N/A	TRUE	FALSE	TRUE	TRUE	7
35	FALSE	TRUE	FALSE	FALSE	#N/A
NULL!	FALSE	TRUE	TRUE	TRUE	1
FALSE	FALSE	TRUE	FALSE	TRUE	#N/A

<i>Formula or cell value</i>	<i>ISNA</i>	<i>NOT(ISNA)</i>	<i>ISERROR</i>	<i>NOT(ISERROR)</i>	<i>ERROR.TYPE</i>
NUM!	FALSE	TRUE	FALSE	TRUE	#N/A
	FALSE	TRUE	FALSE	FALSE	#N/A
DIV/0	FALSE	TRUE	TRUE	TRUE	2

17.6

LOOKUP OR “LOCATION” FUNCTIONS

All the functions mentioned in this section are accessible through INSERT/FUNCTION/LOOKUP.

COLUMN/ROW

This function evaluates the column/row number of a reference.

- COLUMN(F181) = 6
- ROW(F181) = 181

COLUMNS/ROWS

This function evaluates the number of columns/rows in a reference.

- COLUMNS(B2:F181) = 5
- ROWS(B2:F181) = 180

INDEX, MATCH, OFFSET, HYPERLINK, ADDRESS, TRANSPOSE, AREAS, INDIRECT

Discussion of these functions is beyond the scope of this book. The functions are useful while developing Excel using Visual Basic for Applications (VBA).

CHAPTER 18

“SMART” NESTED FUNCTIONS THAT RESPOND TO FORMULA RESULT

The topics discussed in this chapter are:

- IF FUNCTION
- CHOOSE FUNCTION

18.1

IF

The function “IF” is probably the most useful Excel function. A clever use of the IF function makes available an amazing level of smartness in formulae. The function provides almost coding-like binary functionality — you can nest up to seven IF functions. Therefore, you can write in 21 possible actions as long as the actions can be set up as TRUE/FALSE conditions. The innermost “IF” is evaluated first, and the outermost the last.

IF(logical expression that may evaluate to TRUE or FALSE, x1 or value/action if the logical expression is TRUE, x2 or value/action if the logical expression is FALSE)

Stage 1:

Excel evaluates the logical expression first. The result is TRUE or

FALSE.

Stage 2:

If the first stage result is TRUE, then Excel evaluates x1. If the first stage result is FALSE, then Excel evaluates x2. An option may be a number, string, formula or function, or cell reference

The IF function often nests and uses many other information or IS and logical/smart functions. Many samples will be available at <http://www.vjbooks.net/excel/samples.htm>.

18.2

CHOOSE

CHOOSE runs one of several optional user-defined/chosen values/references/formulas based on an index number which that may take the values 1 to 29. The index number is from a user-set cell reference. CHOOSE can be used as a “super-IF if the conditionality inherent in the analysis may have more than a simple YES/NO result.

CHOOSE(index, option 1, option 2,..., up to a maximum of option 29)

The index is a number 1 between 29, or a formula or reference to a cell evaluating to an integer between 1 and 29. (Excel truncates down decimal-bearing numbers.) If the value of the index = 1, then option 1 (a value, cell reference, or function) will be evaluated. If the index equals 2, then option 2 will be evaluated ...and so on until a maximum of 29 options.

Stage 1: Evaluation of the index

The function first evaluates the index. The cell referenced as the index may contain a number, a reference to another cell or a formula. Assume that the result is index = x, where x is between 1 and 29.

Stage 2: Depending on stage 1, executing the correct option

In the second stage, the function chooses “option x” where x is the evaluated value of the index. An option may be a number, string, formula, or function, or cell/range reference.

AVERAGE(CHOOSE(7, A1:A100, A101:A200, A201:A300, A301:A400, D1:D100, D101:D200, D201:D300, D301:D400)) = AVERAGE (D201:D300)

Many samples will be available at

<http://www.vjbooks.net/excel/samples.htm>.

CHAPTER 19

TRACING CELL REFERENCES & DEBUGGING FORMULA ERRORS

This short chapter demonstrates the following topics:

- TRACING THE CELL REFERENCES USED IN A FORMULA
- TRACING THE FORMULAS IN WHICH A PARTICULAR CELL IS REFERENCED
- WATCH WINDOW
- ERROR CHECKING
- FORMULA EVALUATION

19.1

TRACING THE CELL REFERENCES USED IN A FORMULA

Click on the cell that contains the formula whose references need to be visually traced. Pick the menu option **TOOLS/AUDITING/TRACE PRECEDENTS**. (For a pictorial reproduction of this, see Figure 167.)

Figure 167: Tracing precedents. These options are from Excel versions prior to Excel XP.

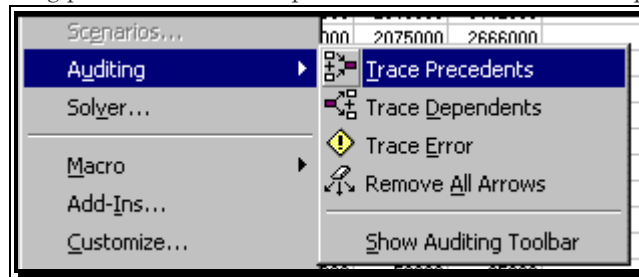
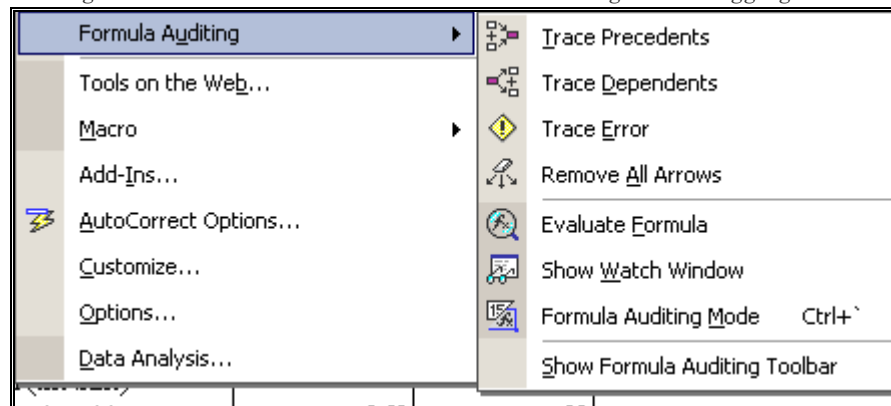


Figure 168: Excel XP offers several error-checking and debugging tools.



As shown in Figure 169, blue arrows will trace the references.

If a group of cells is referenced, then the group will be marked by a blue rectangle. The two rectangular areas are referenced in the formula.

Note:

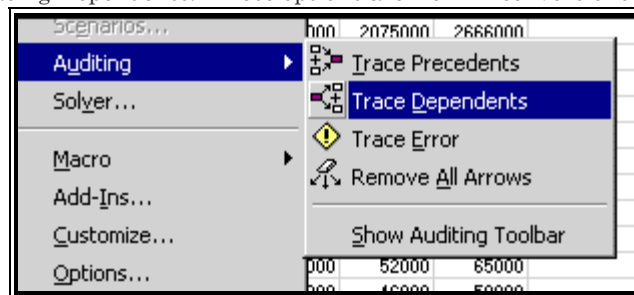
In section 24.5.b , you will learn how to select all the cells that are precedents of the formula in the active cell.

3195000	3521000	3776000
2718000	418E+08	3577000
2366000	2699000	3488000
2096000	2348000	3142000
1562000	2075000	2666000
1302000	1543000	2309000
968000	1282000	2030000
674000	946000	1494000
635000	650000	1217000
571000	597000	867000
1006000	1194000	1505000
28109000	31599000	38636000
234000	254000	261000
45000	52000	65000
36000	46000	59000
47000	39000	56000
62000	49000	51000
63000	63000	43000
43000	64000	51000
29000	47000	64000
16000	28000	62000

You may want to do the opposite— see which formulas reference a particular cell.

- First, click on the cell of interest.
- Then, pick the menu option **TOOLS/AUDITING/TRACE DEPENDENTS** as shown in Figure 170. Now the arrows will go from the active cell to all the cells that have formulas that use the active cell.

Figure 170: Tracing Dependents. These options are from Excel versions prior to Excel XP.



Remove all the auditing arrows by following the menu path TOOLS/AUDITING/REMOVE ALL ARROWS. In section 24.5.a you will learn the simple process through which you can select all the cells whose formulas are *dependents* of the active cell.

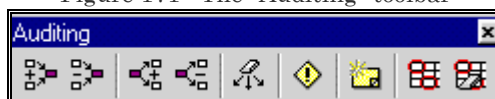
19.3

THE AUDITING TOOLBAR

The “Auditing” toolbar opens automatically when you are using the auditing option (TOOLS/AUDITING) to review formula references.

See chapter 16 on page 148 to learn how to add individual icons or a group of icons to the Excel toolbar. In the XP version of Excel, you can launch the toolbar through the menu option TOOLS/AUDITING/SHOW FORMULA AUDITING TOOLBAR.

Figure 171: The “Auditing” toolbar



19.4

WATCH WINDOW (ONLY AVAILABLE IN THE XP VERSION OF EXCEL)

The window is accessed through the menu path **TOOLS/ AUDITING/ SHOW WATCH WINDOW**, or **VIEW/ TOOLBARS/ WATCH WINDOW**.

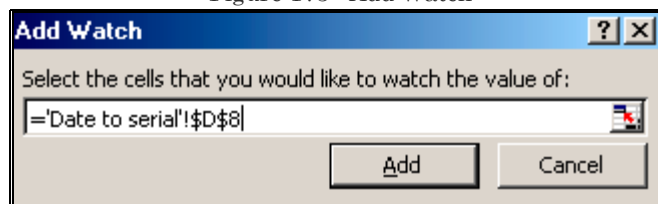
Figure 172: The Watch Window may not display correctly. Use the mouse to drag the walls of the dialog to a workable size.



Add one cell on whose values you want to keep tabs.

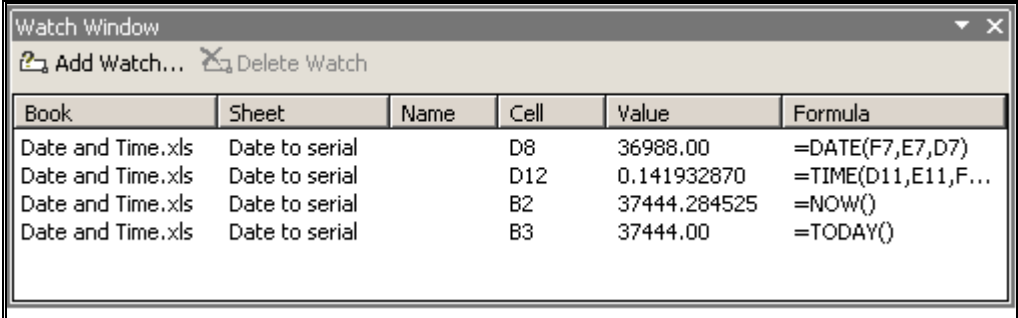
The value will be shown in the Watch Window so that you can see the value even if you are working on cells or sheets that are far from the cell whose value is being “watched.”

Figure 173: Add Watch



You can add many cells to the Watch Window. Note that the Watch Window provides precise information on the location of the cell being watched and the formula in the cell. For example, the first watched cell is on cell D8 in sheet “Date to serial” in the file “Date and Time.xls.” The formula in the cell is “=DATE(F7, E7, D7)”.

Figure 174: You can add many cells to the Watch Window



Book	Sheet	Name	Cell	Value	Formula
Date and Time.xls	Date to serial		D8	36988.00	=DATE(F7,E7,D7)
Date and Time.xls	Date to serial		D12	0.141932870	=TIME(D11,E11,F...
Date and Time.xls	Date to serial		B2	37444.284525	=NOW()
Date and Time.xls	Date to serial		B3	37444.00	=TODAY()

19.5

ERROR CHECKING AND FORMULA EVALUATOR (ONLY AVAILABLE IN THE XP VERSION OF EXCEL)

The tools are accessed through TOOLS/ERROR CHECKING and TOOLS/FORMULA AUDITING/EVALUATE FORMULA.

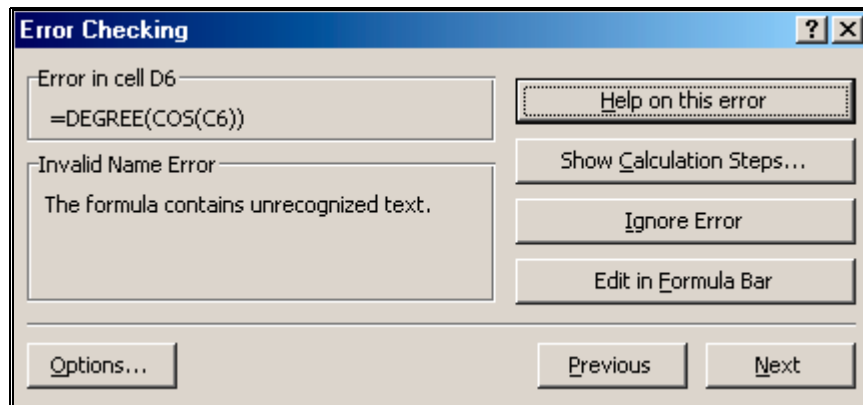
The Error Checking dialog shows the formula in the cell as well as the type of error. In this example, these are “=DEGREE(COS(C6))” and “Invalid Name Error,” respectively.

The button (“Help on this error”) links to a help file containing assistance on understanding and debugging the error.

The button “Show Calculation Steps” links to a step-by-step debugger that assists in catching the calculation step at which the error occurred.

This debugger has the same functionality as the Formula Auditor (accessed through TOOLS/FORMULA AUDITING/EVALUATE FORMULA).

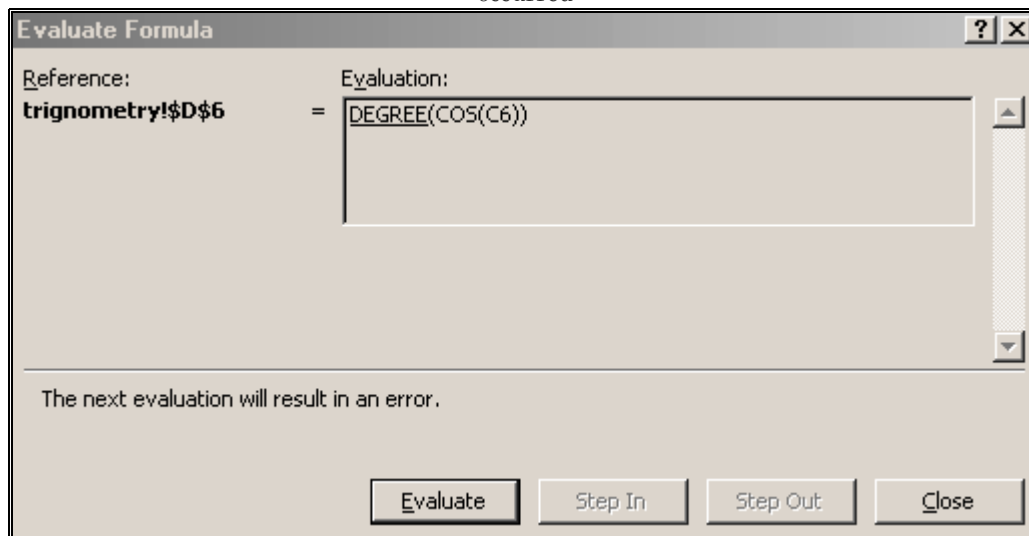
Figure 175: The Error Checking dialog shows the formula in the cell as well as the type of error



The button “Ignore Error” keeps the error “as is.” The button Options opens the dialog for setting error-checking options. The choices within the dialog are listed in section 19.8.

The Formula Evaluator shows the step at which the first calculation error occurred. This helps in identifying the primary problem. In this example, no error has occurred in the formula part “COS(C6)”. The dialog informs you that “The next evaluation (that is, calculation step), will result in an error.”

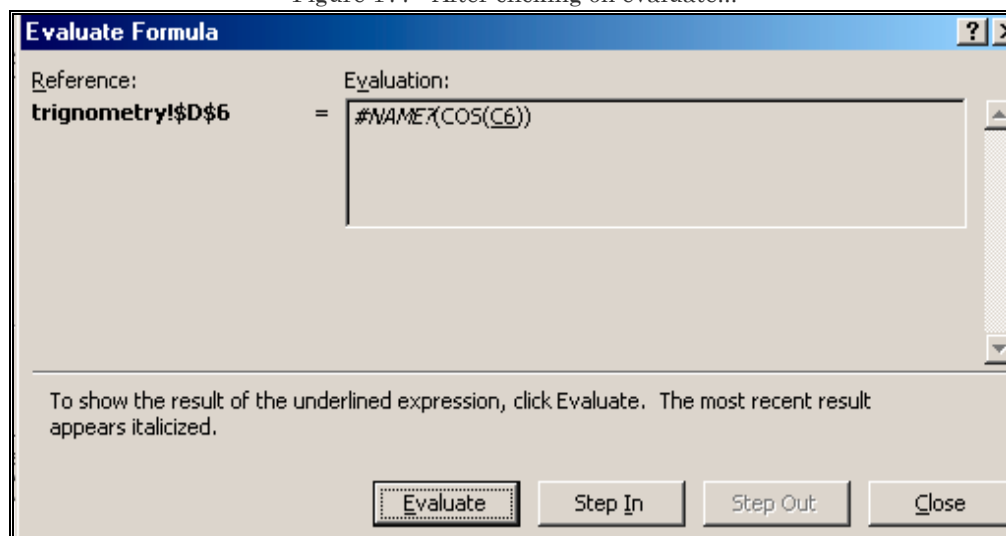
Figure 176: The Formula Evaluator shows the step at which the first calculation error occurred



After clicking on evaluate, you see that the error is in the formula part “DEGREE.” Excel also informs you of the type of error— “#NAME?” suggests that “DEGREE” does not match the name of any Excel function. (The correct function is “DEGREES.”)

The “COS” function is nested within the DEGREE function. Clicking on “Step In” will evaluate the nested function only.

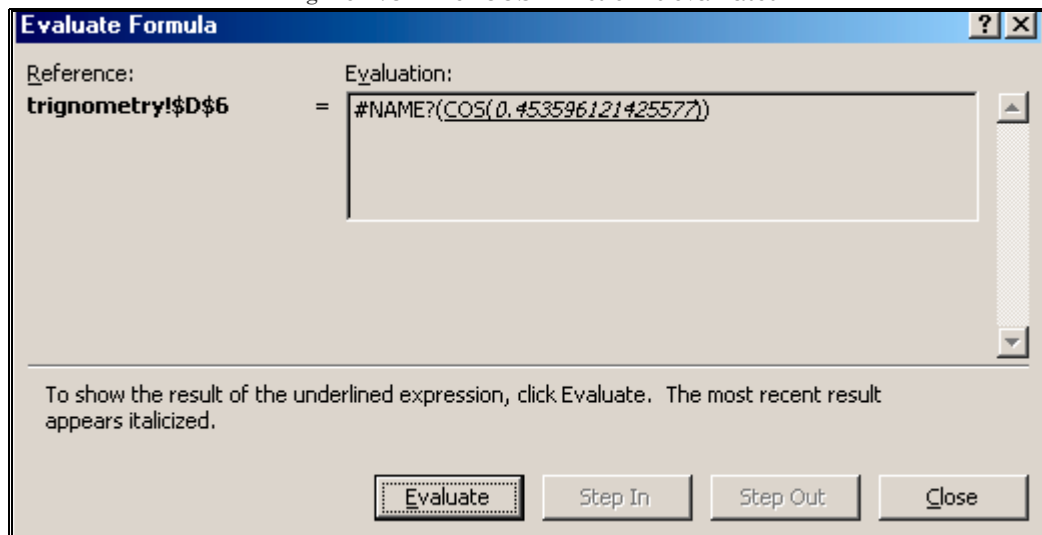
Figure 177: After clicking on evaluate...



The “COS” function is evaluated. The function has no error.

If a function has more than two levels of nesting, then you can use the “Step Out” button to evaluate the function at the higher level of nesting.

Figure 178: The “COS” function is evaluated



19.6

FORMULA AUDITING MODE (ONLY AVAILABLE IN THE XP VERSION OF EXCEL)

This feature is accessed through TOOLS/FORMULA AUDITING/FORMULA AUDITING MODE. After this mode is selected, when you select a cell that has or is referenced by a formula, Excel highlights the other referenced/referencing cells.

In addition, you have quick access (via the “Formula Auditing” toolbar) to all the Auditing tools discussed earlier in this chapter.

Figure 179: Formula Auditing Mode

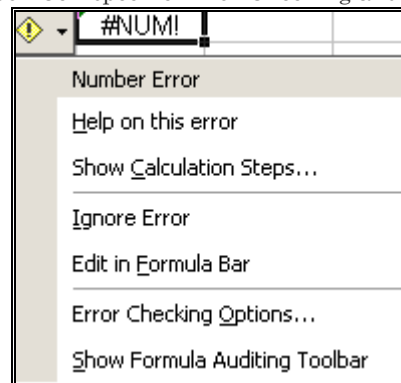
10	Hyperbolic Functions	2	Number
11	COSH	Real Number	=COSH(B10)
12	SINH	Real Number	=SINH(A11)
13	TANH		=TANH(B10)
14			

19.7

CELL-SPECIFIC ERROR CHECKING AND DEBUGGING

On every cell whose value evaluates to an error value, you will see a small icon with a “!” image and a downward arrow. Click on the arrow to obtain assistance for debugging the error.

Figure 180: Cell-specific Error Checking and Debugging



In the example shown in the figure, the options show:

- the error type (“Number Error”),
- a link to assistance on understanding and debugging the error (“Help on this error”),
- a step-by-step debugger to catch the calculation step at which the error occurred (“Show Calculation Steps”),
- the option to ignore and thereby keep the error as is (“Ignore Error”),
- a link to directly edit the formula in the cell (“Edit in Formula Bar”),

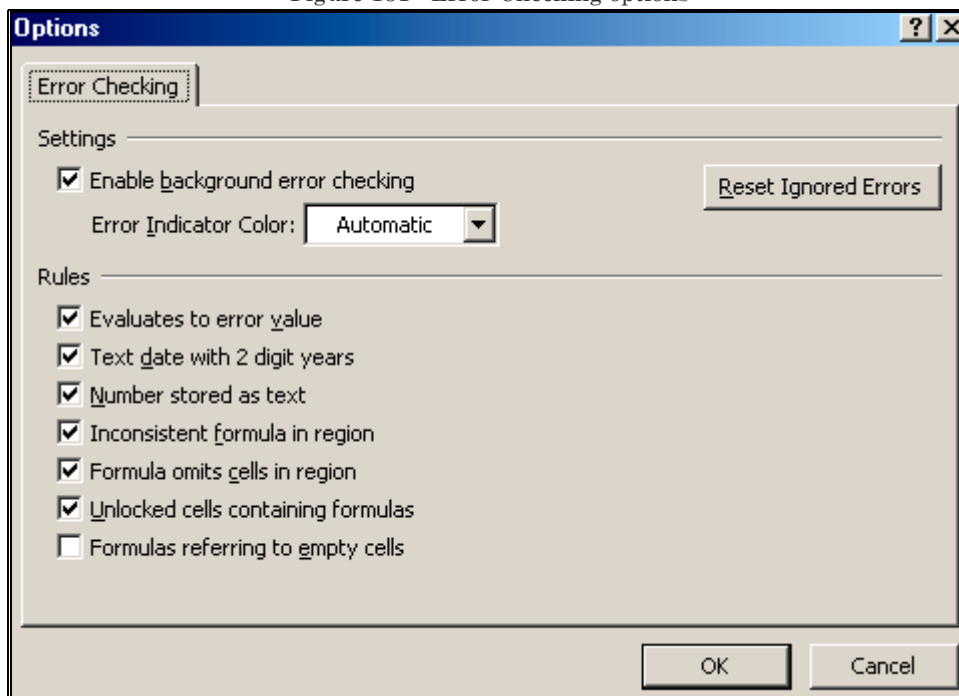
- the overall error-checking options (“Error Checking Options”), and
- direct access to the Formula Auditing Toolbar (“Show Formula Auditing Toolbar”) and, thereby, to all the features of Auditing (these features are taught in this chapter)

19.8

ERROR CHECKING OPTIONS

The Error Checking options can be assessed through TOOLS/OPTIONS/ERROR CHECKING or through TOOLS/ERROR CHECKING/OPTIONS. The dialog is reproduced in the next figure.

Figure 181: Error Checking options



You can inform Excel to show as an error any cell: that contains:

- A formula that evaluates to an error value
- A formula that refers to an empty cell
- A formula that is not consistent with the other formulas and cell references in neighboring cells
- A two-digit year (like “02”) instead of a four-digit year (like “2002”)
- A number stored as text

The other options are beyond the scope of this book. I recommend sticking with the default settings reproduced in the next figure.

CHAPTER 20

NESTED FUNCTIONS

This chapter teaches:

- TOOLS THAT ASSIST WITH NESTING
- NEW TOOLS IN EXCEL XP

20.1

DEFINING THE NESTED FUNCTION

Nested functions may be written in by hand or with the assistance of the “Insert Function” dialog.

Nesting by hand

Once you are familiar with the function names and arguments/requirements, you can type in the nested function directly into the cell. In Excel XP, the Formula Bar Assistant makes this process easier by:

- Providing the list of arguments/requirements for a function once you type in the name of the function (in the next figure note that the Assistant shows the expanded formula notation for AVERAGE with the requirement “number1” in bold even though I have only typed “AVERAGE” in the Formula Bar, and

- b) Using different colors for the parenthesis (brackets) enclosing each function. This reduces the probability of errors in placing the closing parenthesis, or in failing to include sufficient number of closing brackets.

Figure 182: Using the Formula Bar Assistant



20.1.A NESTING WITH THE ASSISTANCE OF THE “INSERT FUNCTION” DIALOG

Excel (XP and earlier versions) provide access to the “Insert/Paste Function” dialog at each level of nesting within a formula.

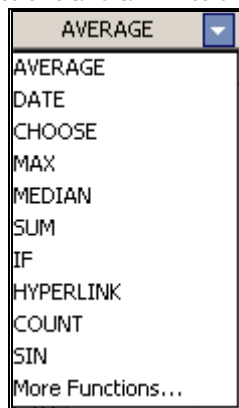
Figure 183: Click on the arrow



Assume you want to define the same formula as shown in the previous figure. You have already user INSERT/FUNCTION to define the outer function “NORMDIST.” Now, you have to define the inner function AVERAGE. Place the cursor at the location (within the NORMDIST function) where the function AVERAGE is to be inserted, and click on the arrow shown at the left edge of the Formula Bar.

A list of recently-used functions will be displayed. The next figure illustrates this.

Figure 184: Recently used functions and a link to the “Insert/Paste Function” dialog

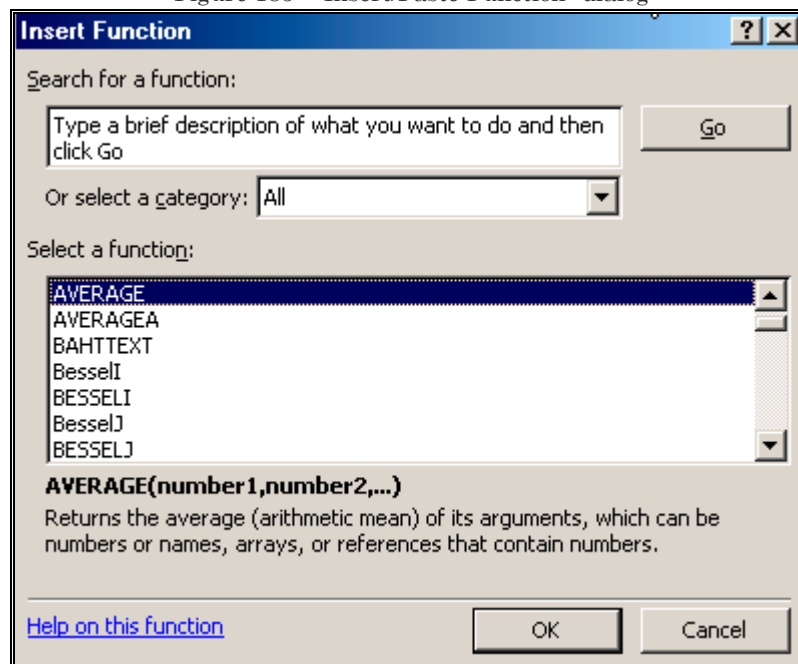


Pick the last option “More Functions” in case the sought function is not in this list (or, if you have a desire for searching for a “better” function).

Select a function.

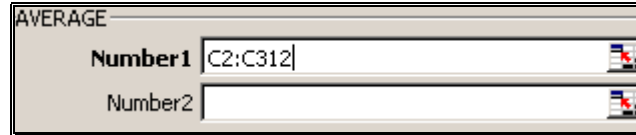
The “Insert/Paste function” dialog opens. Use this dialog to select or completely define a function. (Always define the “inner” nested functions completely in one step.)

Figure 185: “Insert/Paste Function” dialog



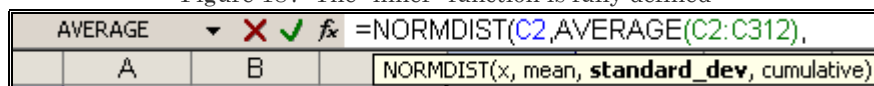
Select the function and complete all function arguments/requirements.

Figure 186: The “inner” nested function is best defined using its dialog



When you execute the dialog by clicking on OK, you will be taken back to the Formula Bar. The updated Formula bar is reproduced in the next figure.

Figure 187: The “inner” function is fully defined



You need to define the next argument/requirement for the “outer” function NORMDIST. (Note that the Formula Bar Assistant is suggesting this by making bold the font for the requirement “standard_dev.” This requirement can also be completed using the “Insert/Paste Function” dialog as you did earlier for the function AVERAGE.

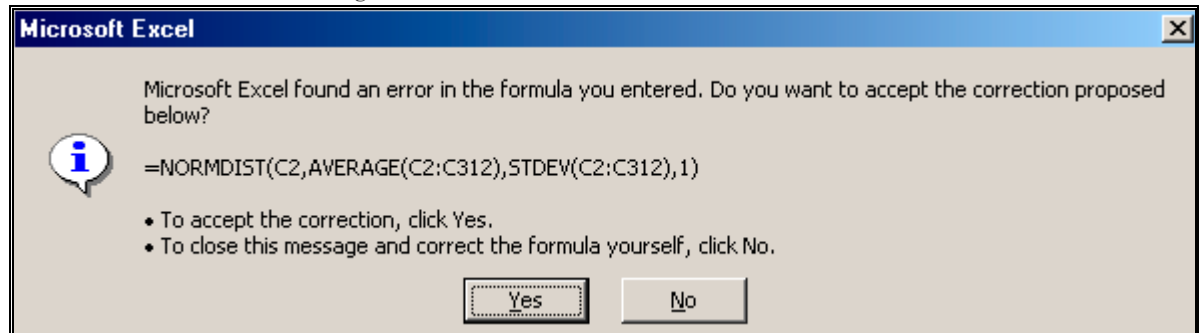
Figure 188: The requirement “standard_dev” can be defined with the function STDEV



In case you make a simple error (like forgetting to place a closing parenthesis), Excel will suggest a correction after you try to finish the formula.

Evaluate whether Excel has corrected your error correctly; if so, click on OK.

Figure 189: Formula AutoCorrection



The AutoCorrection feature is upgraded in the XP version of Excel in terms of the types of errors AutoCorrected.

FORMULA BAR IDENTIFICATION OF ERROR

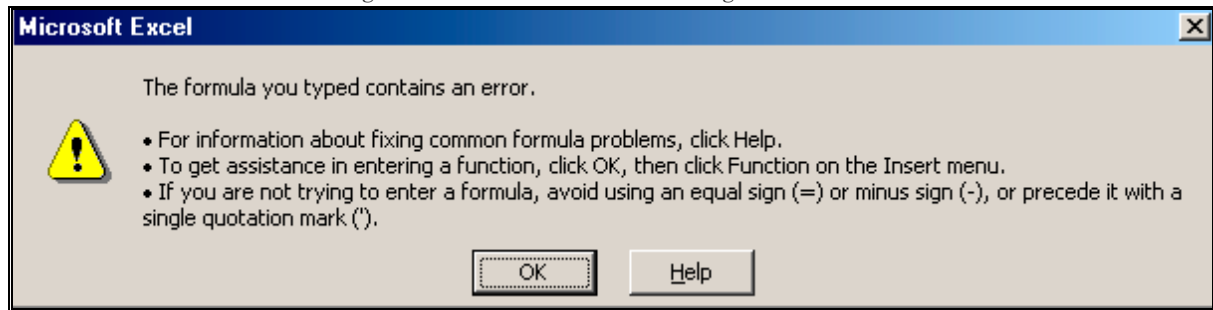
Even if Autocorrect does not correct the error, Excel will indicate the location of the error. Assume you use the same formula as before, but failed to type a comma before the function STDEV.

Figure 190: The erroneous formula

```
=NORMDIST(C2,AVERAGE(C2:C312)STDEV(C2:C312),1)
```

When you finish the formula and press the ENTER key, Excel will show the warning reproduced in the next figure.

Figure 191: Formula Error warning



Choose the option OK. Look at the Formula Bar. Excel has highlighted the location where an error was found.

Figure 192: Excel locates the location of the error

A screenshot of the Excel Formula Bar. The formula entered is "=NORMDIST(C2,AVERAGE(C2:C312),STDEV(C2:C312),1)". The text "C2" is highlighted in blue, "AVERAGE(C2:C312)" is highlighted in green, and "STDEV(C2:C312)" is highlighted in black. The closing parenthesis ")" is also highlighted in black.

20.3.A FUNCTION IDENTIFICATION IN THE FORMULA BAR ASSISTANT

In Excel XP, the Formula Bar Assistant displays only that function which directly references the argument/requirement on which you place the cursor.

For example, if you place the cursor on the cell references used in the function "AVERAGE," then the Formula Assistant Bar only shows the function AVERAGE and placeholders for its requirements.

Figure 193: Cursor within the arguments for AVERAGE

=IF(ISNUMBER(AVERAGE(C2:C312)),"The mean equals","The mean cant be calculated")							
C	D	AVERAGE(number1, [number2], ...)	G	H	I		

If cursor is on an argument of the function ISNUMBER²¹

The Formula Assistant Bar will show only the ISNUMBER function and placeholders for its requirements.

Figure 194: Cursor within the arguments for ISNUMBER but not within the arguments for AVERAGE

=IF(ISNUMBER(AVERAGE(C2:C312)),"The mean equals","The mean cant be calculated")							
C	ISNUMBER(value)	E	F	G	H	I	

If cursor is on an argument of the function IF²²

The Formula Assistant Bar will show only the IF function and placeholders for its requirements.

Figure 195: Cursor within the arguments for IF but not within the arguments for ISNUMBER or AVERAGE

=IF(ISNUMBER(AVERAGE(C2:C312)),"The m							
IF(logical_test, [value_if_true], [value_if_false])							

²¹ The function AVERAGE is an argument for the function ISNUMBER.

²²The function ISNUMBER is an argument for the function IF.

Identification of cells referenced by the function highlighted in the Formula Bar

In Excel XP, blue rectangles will identify the cells referenced by the function currently shown in bold in the Formula Bar Assistant.

20.4

MULTIPLE NESTING: TIPS

- Always use the “Insert/Paste Function” dialog for defining functions.
- Write the specifics of the innermost function first.
- Complete the innermost function first, and then move up levels.
- Do not forget to include all the arguments/requirements of the outer functions. This eventuality can be precluded by always using the “Insert/Paste Function” dialog.
- If the function has an error that cannot be easily identified, use the Error Checking or Formula Evaluation tools. These tools are taught in 19.5.

CHAPTER 21

ADD-INS: ENHANCING EXCEL

This chapter discusses the following topics:

- WHAT CAN AN ADD-IN DO?
- WHY USE AN ADD-IN (AND NOT JUST EXCEL
MACROS/PROGRAMS)?
- ADD-INS INSTALLED WITH EXCEL
- OTHER ADD-INS
- THE STATISTICS ADD-IN
- CHOOSING THE ADD-INS

21.1

ADD-INS: INTRODUCTION

An “Add-In” is a software application that adds new functionality to Excel. The Add-In typically seamlessly fits into the Excel interface, providing accessibility to its functionality through

- New menus and/or new options in existing menus
- New functions
- New toolbars and specific toolbar icons

21.1.A WHAT CAN AN ADD-IN DO?

Almost anything an imaginative software developer could create. Usually, an Add-In provides functionality that is useful for a particular type of analysis/industry — statistics, finance, real estate, etc.

21.1.B WHY USE AN ADD-IN?

The Add-In could have its base code written in software languages like C, C++, FORTRAN, Pascal, etc. This is important because some algorithms and operations (like simulations) operate best when written in a specific language. Therefore, the developer uses the best language/tool to create the functionality and then packages this inside an Add-In.

21.2 ADD-INS INSTALLED WITH EXCEL

Some Add-Ins are available in the Microsoft Office CD-ROM and are installed (but not activated²³) along with Excel. I show the use of two Add-ins.

²³ Figure 540 and Figure 542 show how to activate the Add-ins

21.3

OTHER ADD-INS

Many commercially sold Add-Ins can be almost like separate software just needing Excel as the “host.” Two examples:

- Crystal Ball™ risk analysis software
- *UNISTAT*™ software for conducting advanced statistics and econometrics from inside Excel

Hundreds of software companies construct Add-Ins. The greatest contribution of this book, if I succeed in doing so, would be the opening of this massive potential functionality to Excel users.

21.4**THE STATISTICS ADD-IN**

The Analysis ToolPak Add-In that ships with Excel can conduct several procedures including descriptives, regression, ANOVA, F-test, correlation, T-tests, moving average, and histogram. Let us learn how to use this “Add-In.”

21.4.A

CHOOSING THE ADD-INS

Choose the menu option **TOOLS/ADD-INS**. You will see several Add-Ins as shown in Figure 196. (You may not see all the Add-Ins shown in the next two figures.)

Figure 196: Selecting an Add-In

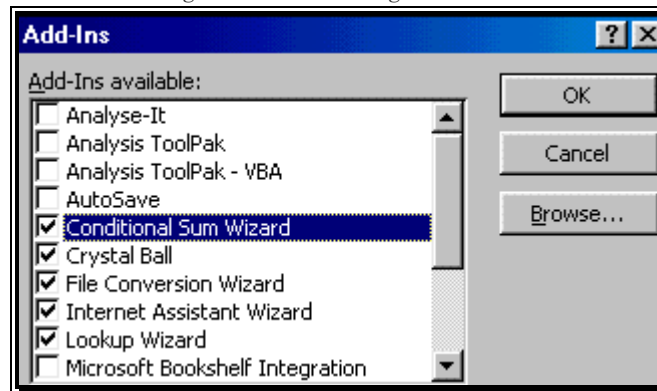
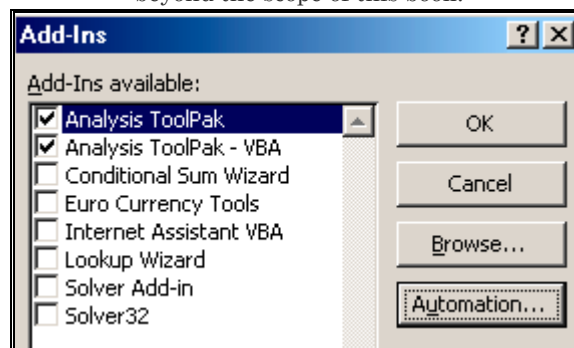


Figure 197: In Excel XP, the Add-Ins dialog provides access to “Automation.” This topic is beyond the scope of this book.



You need the “Analysis ToolPak Add-Ins.” Select — by clicking on it — the box to the left of these Add-Ins (shown in Figure 198). Execute the dialog by clicking on the button OK and wait for some time while the Add-Ins are “loaded” or “registered” with Excel. An Add-In has to be loaded/registered before it is available for use. The Add-In remains loaded across sessions. It is only “unloaded” when you select the option TOOLS/ADD-INS and deselect the Add-In²⁴.

²⁴ If too many Add-Ins are loaded, Excel may work too slowly, or even freeze. If you find this problem occurring, then just load the Add-in when you are going to use it and unload it before quitting Excel.

Figure 198: The Add-In pair for data analysis



You have activated the “Analysis ToolPak.” At the bottom of the menu TOOLS, you will see the option “DATA ANALYSIS” at the bottom— this option was not there before you accessed the Add-In. (This is illustrated in Figure 199.) The statistical procedures are accessed through this new option.

Note:

Usually Add-Ins expose their functionality by creating new menu options or even new menus. The menu option “Data analysis” provides the statistics functionality available in “Analysis ToolPak” and “Analysis ToolPak VB.” The menu options “Optquest” down till “CB Bootstrap” are linked to the Add-in “Crystal Ball” (not shipped in the Office CD-ROM).

Figure 199: The “Data Analysis” menu option



CHAPTER 22

"IF-THEN" ANALYSIS: SCENARIOS AND GOAL SEEK

This chapter discusses the following topics:

- SETTING THE DESIRED VALUE FOR THE "TARGET" CELL
(THE ONE WITH THE FORMULA THAT REFERENCES THE
"SOLUTION" CELL)
- CHOOSING THE "SOLUTION" CELL
- RUNNING THE UTILITY

22.1

SCENARIOS (FOR "IF THIS ASSUMPTION-THEN THIS RESULT")

The sample data for this section is in the file "Scenarios.xls."

The data in columns "C," "D" and "E" is the size of the labor force in years "1995," "2000" and "2010," respectively, for specific age groups defined in column "A" and for countries defined in column "B." The cell "H3" holds the assumption of the "cumulative or total" growth rate of the labor force from the year 2010 to 2020.

This rate is assumed equal for all age groups and countries. Column "F" is calculated by multiplying the corresponding cell in column "E" with

“100% plus the growth rate of 40% in cell H3.” Therefore, column “F” values are 40% higher than the values in column “E.” The formulas in the cells in column “G” directly reference cell “H3.”

The cells “H6,” “H7,” and “H8” provide statistical parameters for the year 2020 for the country Algeria (that is, for the cells “F2” to “F14”).

These formulas indirectly reference cell “H3” through the formulas in the cells “F2” to “F14.”

Figure 200: The sample data and formula cells

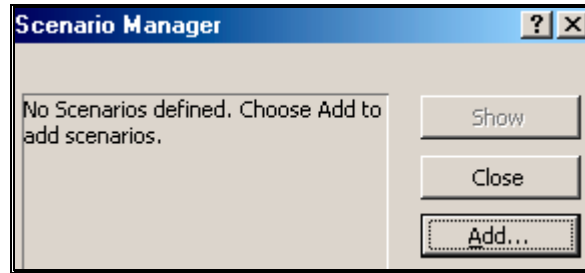
	B	C	D	E	F	G	H
1	Country Name	1995	2000	2010	2020		
2	Algeria	15,218,000	16,284,000	17,846,000	24,984,400	Assumption on Growth Rate 2010-20, Algeria	
3	Algeria	3,195,000	3,521,000	3,776,000	5,286,400	10 year growth in Labor Force=	40%
4	Algeria	2,718,000	415,730,292	3,577,000	5,007,800		
5	Algeria	2,366,000	2,699,000	3,488,000	4,883,200	Output	
6	Algeria	2,096,000	2,348,000	3,142,000	4,398,800	Average	8,890,323
7	Algeria	1,562,000	2,075,000	2,666,000	3,732,400	Median	3,732,400
8	Algeria	1,302,000	1,543,000	2,309,000	3,232,600	Maximum	54,090,400
9	Algeria	968,000	1,282,000	2,030,000	2,842,000		
10	Algeria	674,000	946,000	1,494,000	2,091,600		
11	Algeria	635,000	650,000	1,217,000	1,703,800		
12	Algeria	571,000	597,000	867,000	1,213,800		
13	Algeria	1,006,000	1,194,000	1,505,000	2,107,000		
14	Algeria	28,109,000	31,599,000	38,636,000	54,090,400		

22.1.A

DEFINING THE SCENARIOS

Go to the menu option TOOLS/SCENARIOS. The relevant dialog is shown in the next figure.

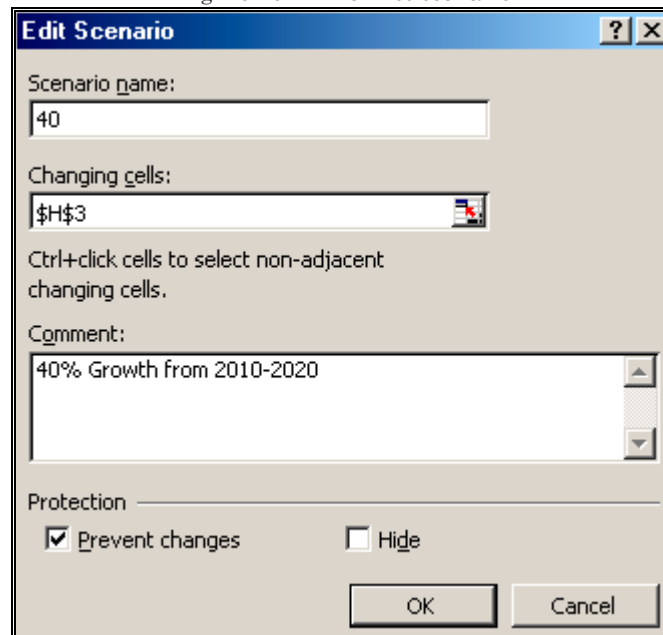
Figure 201: The dialog for TOOLS/SCENARIOS before any scenarios are defined. Click on the button "Add" to define a scenario.



Click on "Add" and define the first scenario. The scenario is the next figure illustrates. The first scenario is named "40." It assumes that the value of cell "H3" is 40% or 0.40.

You can make assumptions of several cells, including non-adjacent cells and cells across sheets.

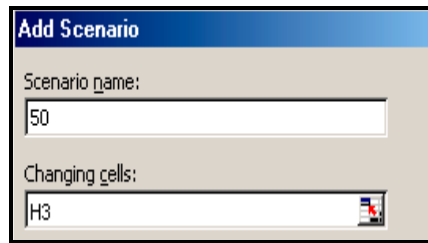
Figure 202: The first scenario



A comment has been added to explain the scenario. All the other options are the defaults — I recommend sticking with them.

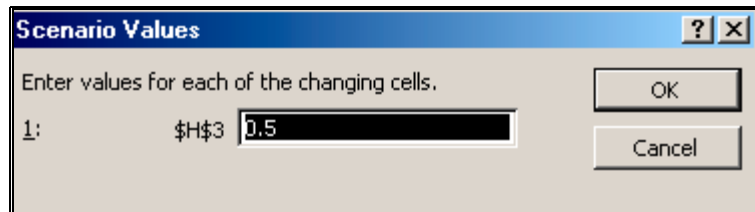
After the first scenario is defined, click on the button “Add” and define the second scenario. This scenario is named “50” and works on changing the cell “H3.”

Figure 203: The second scenario is named “50” and works on changing the cell “H3”



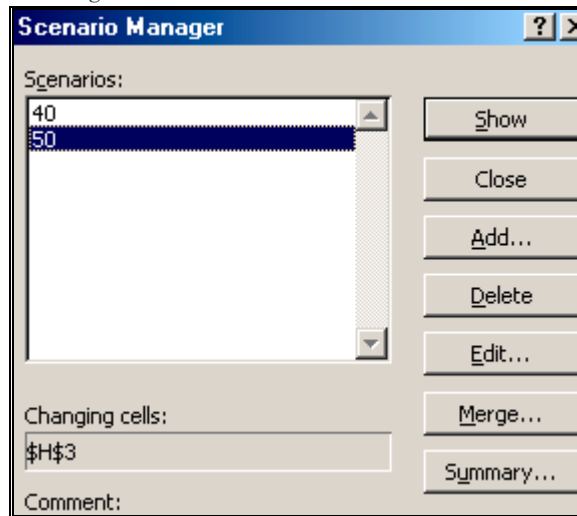
The second scenario assumes that the value of cell “H3” is 50% or 0.50.

Figure 204: The second scenario assumes that the value of cell “H3” is 50% or 0.50



The two scenarios are defined. The dialog shows the two scenarios. The dialog is reproduced in the next figure.

Figure 205: The two scenarios are defined



You can define more scenarios.

Using the Scenarios

Viewing the result of a scenario

Click on the scenario name "40," followed by the button "Show." The cell "H3" will take on the value assumed in the scenario (40% or 0.40). All the cells whose formula references the "assumption cell H3" will change.

In this example, these cells are those in the column "G" (direct reference to the assumption cell) and the values of the formulas for the mean, median and maximum of column "G" (indirect reference to the "assumption cell H3").

Figure 206: Result of the first scenario

Assumption on Growth Rate 2010-20, Algeria	
10 year growth in Labor Force=	40%
Output	
Average	8,890,323
Median	3,732,400
Maximum	54,090,400

Switching over to the view of the result of *another* scenario

Click on the scenario name “50,” followed by the button “Show.” The cell “H3” will take on the value assumed in the scenario (50% or 0.50). All the cells whose formula references the “assumption cell H3” will change.

In this example, these cells are those in the column “G” (direct reference to the assumption cell) and the values of the formulas for the mean, median and maximum of column “G” (indirect reference to the “assumption cell H3”).

Figure 207: Result of second scenario

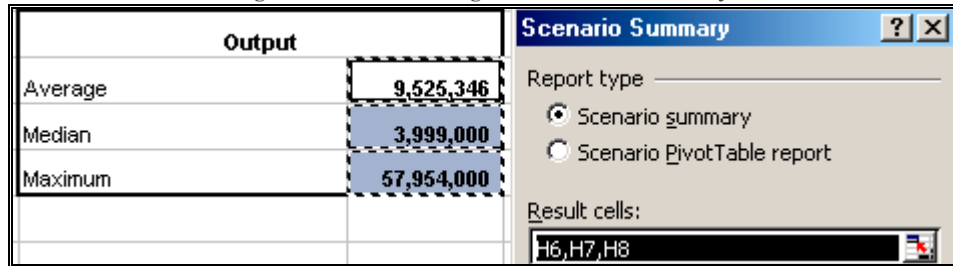
Assumption on Growth Rate 2010-20, Algeria	
10 year growth in Labor Force=	50%
Output	
Average	9,525,346
Median	3,999,000
Maximum	57,954,000

Scenario summary

At this stage, the use of scenarios is not very useful because you can only

see the results of one scenario at one time. You may wonder if a better option is to copy the worksheet and use 40% in cell "H3" of 1 worksheet and 50% in cell "H3" of the other worksheet.

Figure 208: Obtaining a "Scenario Summary"



The real power of Scenarios comes from its ability to create a comparative summary table from the different scenarios. Click on the button "Summary." Choose the option "Scenario summary" and the cells whose values you want to compare across the scenarios. I have chosen the cells that contain the mean, median and maximum of column "G."

The "Scenario Summary" is created and displayed on a new worksheet. Note that the columns compare across scenarios, while the rows display the formula results you wish to compare.

Making the output easily interpretable

You can type in "Assumed Growth Rate," "Mean," "Median" and "Maximum" into cells "C6," "C8," "C9," and "C10," respectively.

Figure 209: The “Scenario Summary” is created and displayed on a new worksheet

	1	2	A	B	C	D	E	F	G
	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								
	11								
	12								
	13								
	14								

Scenario Summary			
Current Values:		40	50
Changing Cells:			
\$H\$3	50%	40%	50%
Result Cells:			
\$H\$6	9,525,346	8,890,323	9,525,346
\$H\$7	3,999,000	3,732,400	3,999,000
\$H\$8	57,954,000	54,090,400	57,954,000

Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.

Using the “Group and Outline” tool

Note that Excel has automatically inserted the “plus and minus” signs, grouping range outlines, and grouping levels (“1” and “2”) to the Scenario Summary table. Experiment with using these indicators to learn more about “Grouping and Outlining,” a skill taught in *Volume 1: Excel For Beginners*.

Figure 210: Collapsing the grouped Scenario columns “D” – “F” by clicking on the grouping indicator “minus” at the top. (The indicator can be seen in the previous figure. The indicator changes to a “plus.”)

Figure 212: Re-expand the rows by clicking on the two “plus” indicators for the rows

	1	2	A	B	C	D	E	F	G
	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	9								
	10								
	11								
	12								
	13								
	14								

Scenario Summary			
Current Values:		40	50
		40% Growth from 2010-2020	50% Growth from 2010-2020
Changing Cells:			
\$H\$3	50%	40%	50%
Result Cells:			
\$H\$6	9,525,346	8,890,323	9,525,346
\$H\$7	3,999,000	3,732,400	3,999,000
\$H\$8	57,954,000	54,090,400	57,954,000

Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.

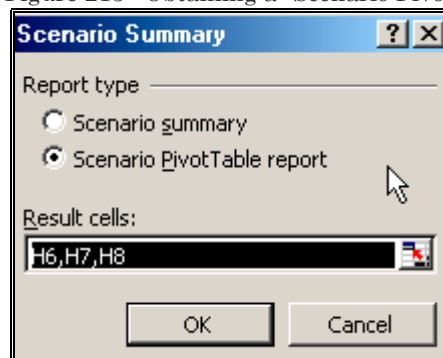
Scenario-based Pivot Tables

Go to the dialog (user-input form) for TOOLS/SCENARIOS after the scenarios have been defined.

Click on the button “Summary.”

Choose the option “Scenario Pivot” and the cells whose values you want use in the data region of the Pivot.

Figure 213: Obtaining a “Scenario Pivot”



The Pivot is created on a new worksheet. This Pivot is simple and small because we have defined only one "assumption cell," two scenarios within this assumption cell, and three "result cells."

- The number of data rows in the Pivot equals the number of scenarios.
- The number of data columns equals the number of result cells.
- The number of "pages" in the Pivot is defined by the number of users who have defined assumption cells.

Figure 214: The Pivot is created on a new worksheet

	A	B	C	D
1	\$H\$3 by	(All) ▼		
2				
3		Result Cells ▼		
4	\$H\$3 ▼	\$H\$6	\$H\$7	\$H\$8
5	40	8890323.077	3732400	54090400
6	50	9525346.154	3999000	57954000
7				
8				

See chapter 4 to learn how to collaborate and work simultaneously on one file. If you click on the "Merge" button in the main Scenarios dialog, then you can merge the scenarios defined by different users. Choose a different page — if you have more than one user — by clicking on its name in the list that opens when you press the arrow on the right of cell "B1."

You can create a separate worksheet and a separate chart for each page using methods taught in *Volume 4: Managing & Tabulating Data in Excel* and *Volume 2: Charting in Excel*.

The users who have defined scenarios will be listed. All lists all the

scenarios defined by all users. Use the “Merge” button to merge scenarios by different users.

Figure 215: The users who have defined scenarios will be listed



22.2

GOAL SEEK (“IF I WANT THIS CELL TO HAVE A CERTAIN RESULT, WHAT VALUE SHOULD THAT CELL TAKE”)

Type this formula into cell F4 of the sample data file “Advanced File2.xls.” —

`=SUM(B2:B8) +(D4*1.23)`

This formula will add the values in cells B2, B3... B8 and then add this sum to the value in cell D4 multiplied by 1.23. *Note that the formula references the cell D4 and the cells B2 to B8.*

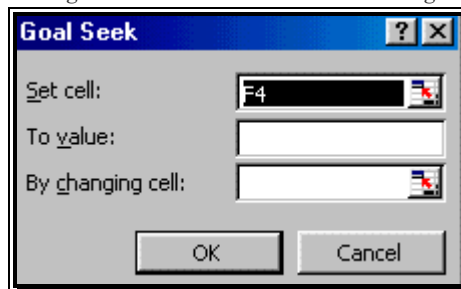
I will show how Excel permits you to find a value for D4 such that F4 equals a desired “target” value. Assume you want to find the value in cell D4 that will make the value of the formula in F4 equal to 10,000,000,000.

22.2.A SETTING THE DESIRED VALUE FOR THE "TARGET" CELL (THE ONE WITH THE FORMULA THAT REFERENCES THE "SOLUTION" CELL)

Click on the cell "F4"— that is, the cell for which a desired value is "sought." Then choose the menu option TOOLS/GOAL SEEK. The relevant dialog is shown in Figure 216.

Enter the desired/target value into the box "to value" as shown in Figure 217.

Figure 216: The "Goal Seek" dialog

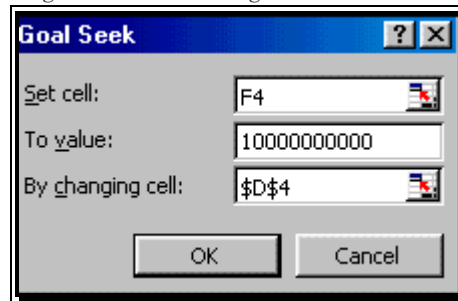


22.2.B CHOOSING THE "SOLUTION" CELL

You want F4 to achieve the given value by changing the value in cell D4. So enter D4 in the box "By changing cell" as shown in Figure 217²⁵.

²⁵ Alternatively, click on the box marked by the arrow and then choose the cell from the sheet.

Figure 217: Choosing the “solution” cell



Running the utility

Execute the dialog by clicking on the button OK. You will be told if a solution was found. Go and look at cell D4. The value in there is the desired one— the value that makes F4 = “target or desired value.”

CHAPTER 23

SAVING OR TRANSFORMING TO SPECIAL WEB AND DOCUMENT FORMATS

This chapter shows how to save/convert Excel files to the following formats:

- PDF
- WEB (HTML, WEB ARCHIVE)
- XML

23.1

CONVERTING TO A PDF (ADOBE ACROBAT) FILE

The PDF format has become popular for distributing reports, especially over the Internet. The format has some advantages over an Excel/Word file format:

- The PDF file has better security measures — you can create a file that cannot be printed, copied, or from which material cannot be extracted.
- The file looks the same on all computers, and

- Users are less hesitant to download PDF files (compared to Microsoft Office files) because of the lower risk of downloading a virus.

Adobe offers several tools for converting to PDF format. Check out their web site adobe.com.

23.1.A CREATING A PDF (ADOBE ACROBAT) FILE FROM THE PRINTOUT

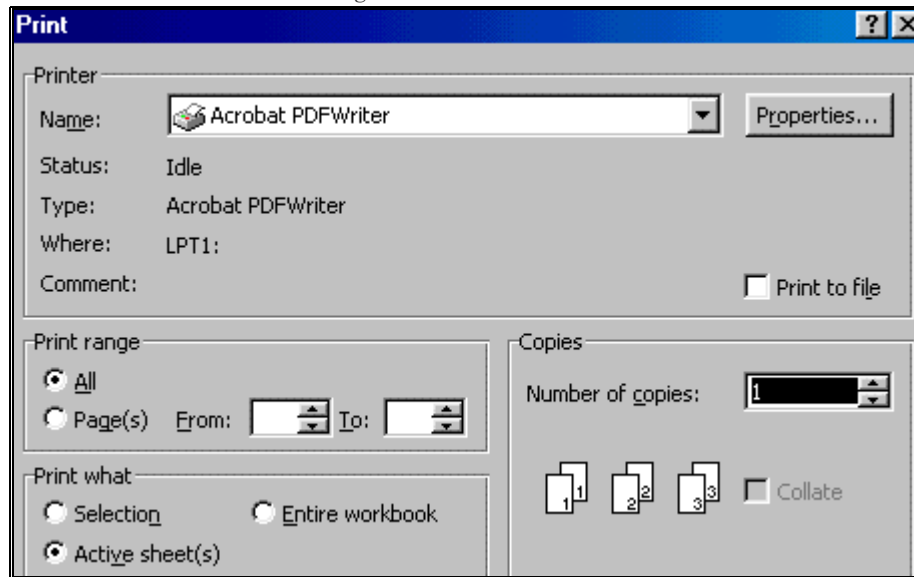
I now discuss one of the tools you can use to convert to PDF. The tool is a PDF “Printer Driver.” With this tool, you print your file into a PDF file.

You will see the option “Acrobat PDF Writer” as one of the printers in the area “Name” as shown at the top of the next figure.

Note:

The PDF Printer Driver is sold at Adobe.com and third-part vendors.

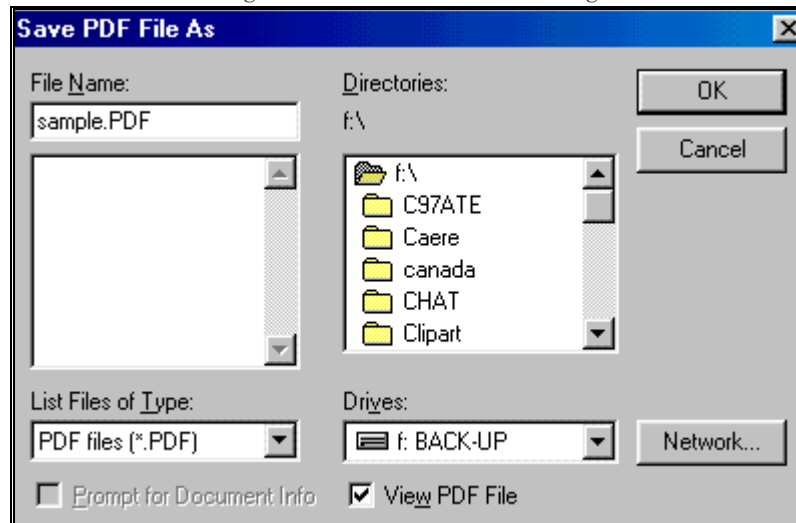
Figure 218: PDF Writer



Choose the “Acrobat PDF Writer” printer option, and the options you desire in the areas “Print range” and “Print what” of the “Print” dialog which is reproduced above. Execute the dialog by clicking on the button OK. The “Save PDF File As” dialog shown in the next figure opens. Choose a location for the PDF file and write in a file name. Execute the dialog by clicking on the button OK. The Excel file will be “printed” out as a PDF file.

Selecting the check-box “View PDF File” will follow the printing task with a display of the file within the Adobe Acrobat Reader.

Figure 219: “Save PDF As” dialog



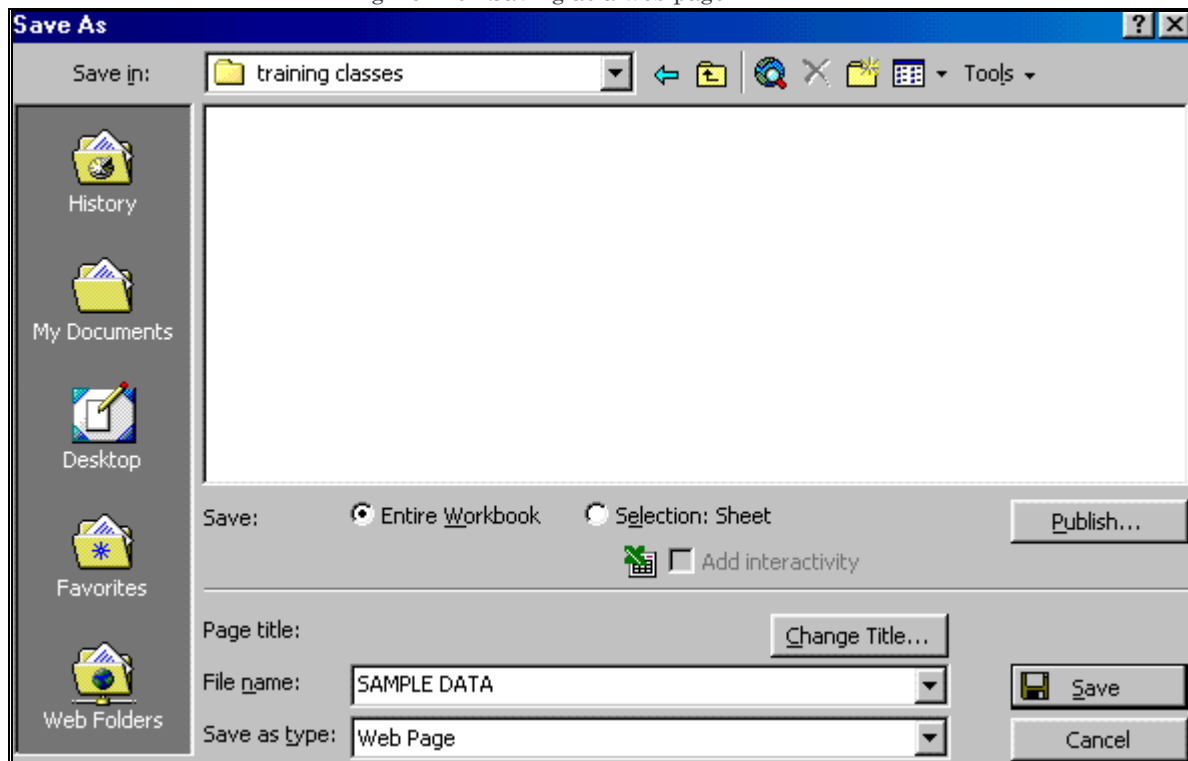
23.1.B OTHER TOOLS FOR CONVERTING ONE OR MULTIPLE FILES INTO PDF

Adobe offers several tools for converting to PDF format. Check out their web site adobe.com.

23.2 SAVING AS AN HTML FILE

An Excel worksheet, chart, or the entire workbook can be saved as an HTML file. This file can be placed on the web. It opens in any web browser like Internet Explorer, Netscape, Opera, or AOL.

Figure 220: Saving as a web page



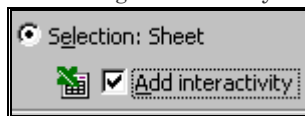
Access the feature through the menu path FILE/SAVE AS WEB PAGE. Choose what you want to include in the HTML file. Click on the button “Save.”

23.2.A INTERACTIVITY WHEN SAVING A WORKSHEET

If you want visitors to the web site to be able to work on Excel data while inside a browser application, then click on the option “Add interactivity.” This option only works if you are choosing to save one Excel worksheet or chart as an HTML file— see the next figure.

Inquire whether Front Page extensions or Microsoft Office extensions are needed for this. (Not all web hosts support this functionality.) This remarkable feature adds Excel-like functionality to data displayed on a web page!

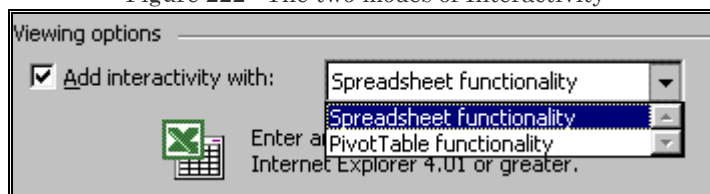
Figure 221:
Adding Interactivity



In the area “Viewing options,” choose what kind of interactivity you desire — “Spreadsheet” or “Pivot Report.” If the current worksheet is not a Pivot Report then you should choose “Spreadsheet Functionality”

Refer to the next section to learn how to use this interactivity after opening the file in a web browser.

Figure 222: The two modes of Interactivity



At this stage, you will be prompted to write a web page title. Type a title and execute the dialog by clicking on the button OK.

Excel will prompt you to enter information about the specific range of data you need on the HTML file. This is shown in the figure below — see the area “Choose” at the top of the dialog.

Figure 223: Setting a title for the web page

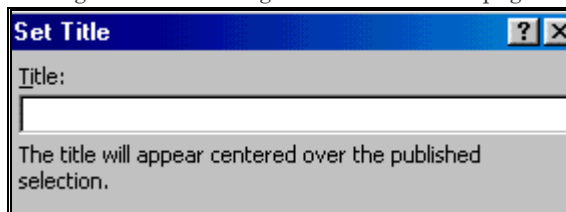
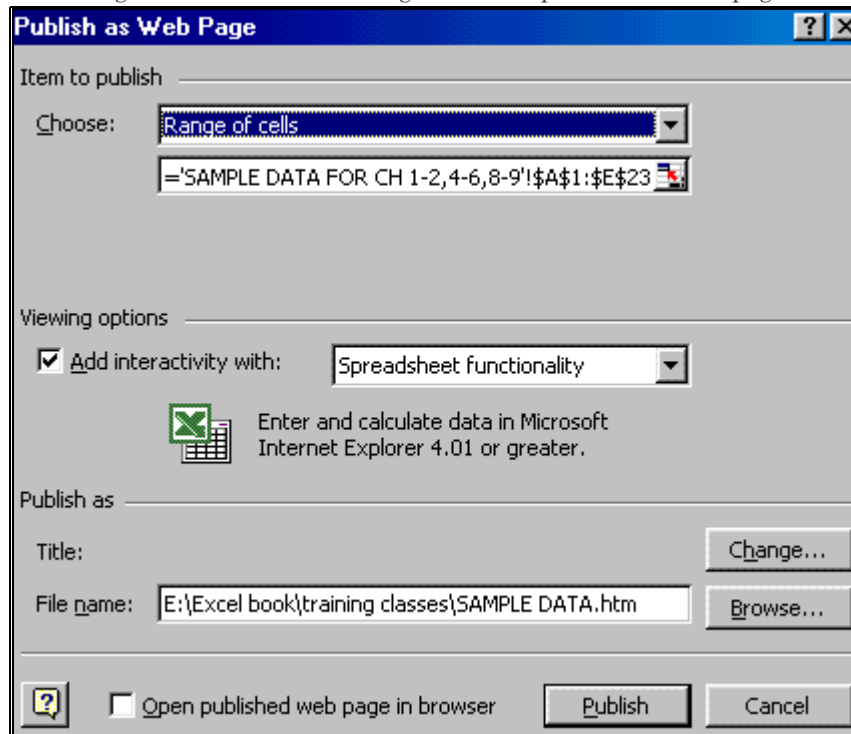


Figure 224: Choose the range of cells to publish as a web page



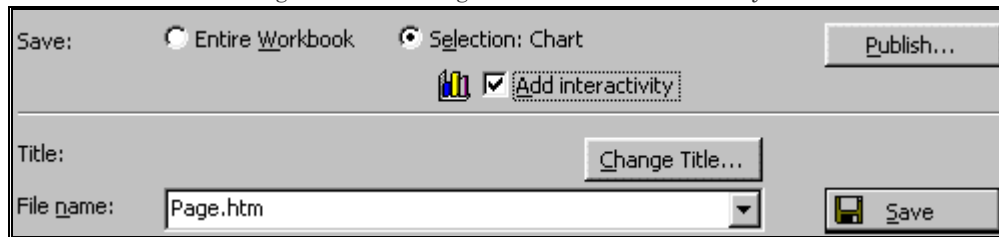
Click on the option “Publish” to complete the process of creating the HTML file.

23.2.B

INTERACTIVITY WHEN SAVING A CHART

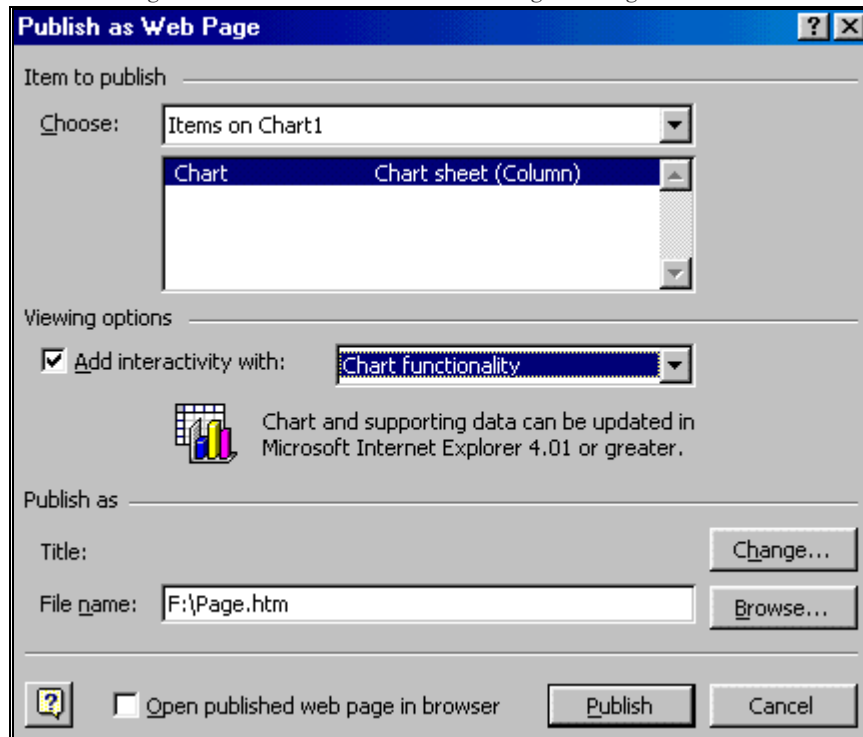
Assume you are saving a chart as an HTML file. Choose the chart and choose the menu option FILE/SAVE AS WEB PAGE. Choose the option “Add interactivity,” type in a name for the HTML file, choose a path for saving the file, and then click on “Save.”

Figure 225: Saving a Chart with Interactivity



In the dialog that opens (shown in the next figure), choose the options as shown. Click on the option “Publish” to complete the process of creating the HTML file.

Figure 226: The “Publish as Web Page” dialog for a chart



Note The option “Open published web page in browser” will launch the default Internet Browser on your computer and display the file you just saved as a web file.

23.3

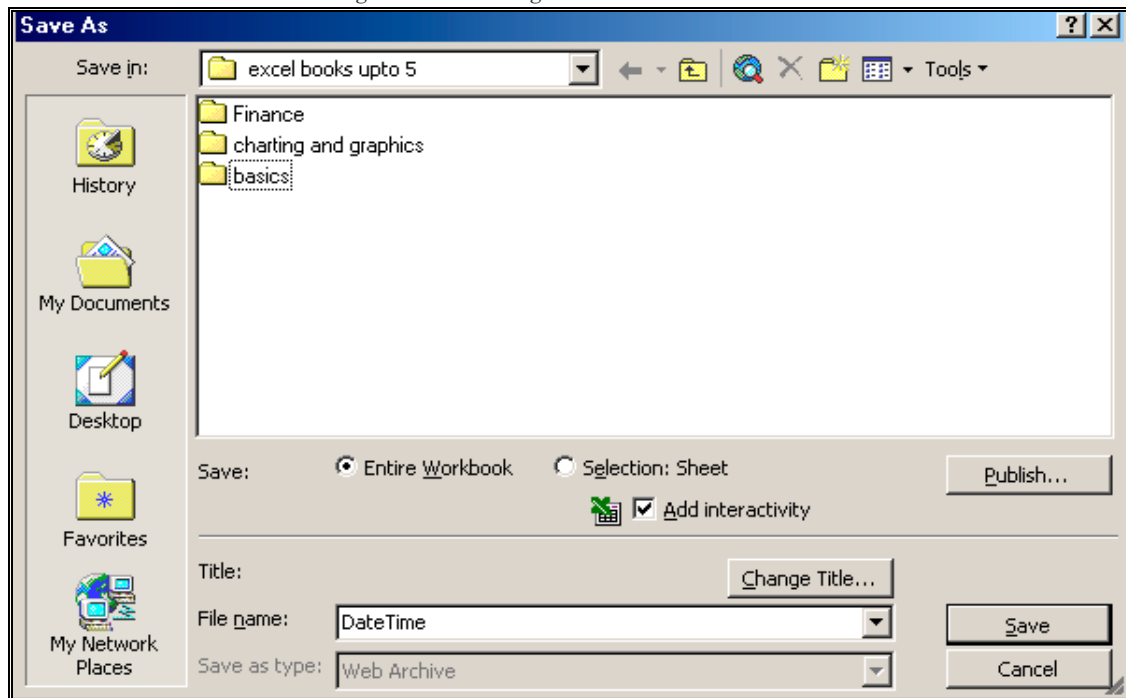
NEW IN THE XP VERSION OF EXCEL: WEB ARCHIVE FORMAT AND XML

The Web Archive format allows the saving of an entire file as on web file. AutoRepublish facilitates easy updating of Excel files on the web. In addition, in the XP version of Excel, you can save in XML format.

23.3.A

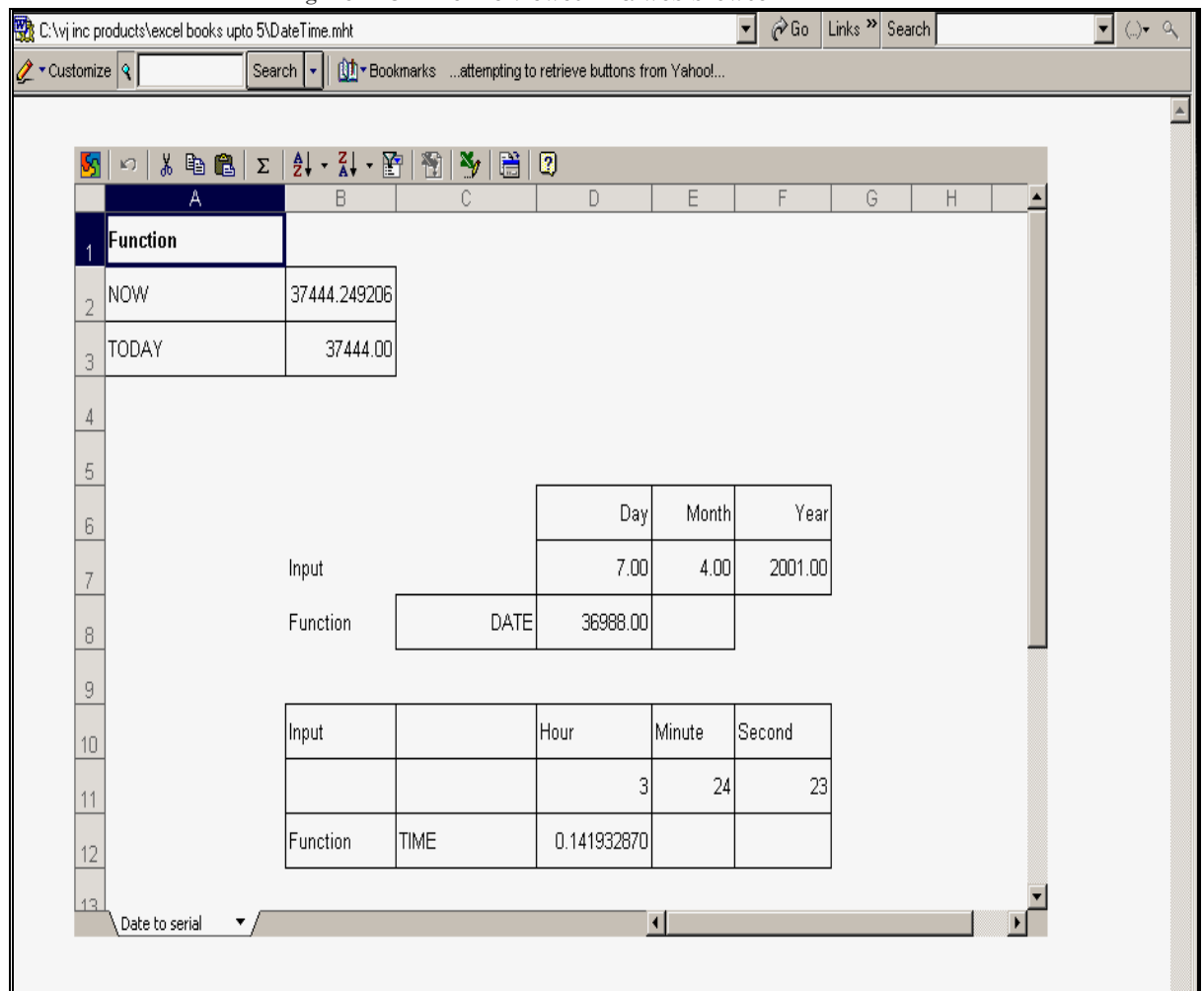
WEB ARCHIVE

Figure 227: Saving as a Web Archive



I recommend selecting “Add interactivity.” The file may be opened in a web browser. (For optimal compatibility, use Internet Explorer.) An example is shown in the next illustration. The example is from the sample file “DateTime.mhtml.”

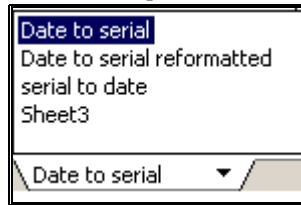
Figure 228: The file viewed in a web browser



The file has several sheets. Focus on the downward arrow at the bottom left of the previous figure. On clicking the arrow at the bottom-left, you will see all the sheets in the file.

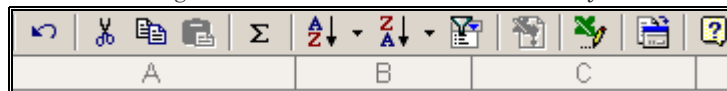
The next figure illustrates this feature.

Figure 229: Viewing the sheets in the file.
Clicking on the name of a sheet opens that sheet in the web browser.



At the top of the file, you will see a short toolbar that provides access to interactivity features. The toolbar is reproduced in the next figure.

Figure 230: The toolbar for interactivity



The toolbar icons provide access to the following features (from left to right):

- Undo
- Cut
- Copy
- Paste
- AutoSum
- Sort Ascending
- Sort Descending
- Filter
- Refresh All

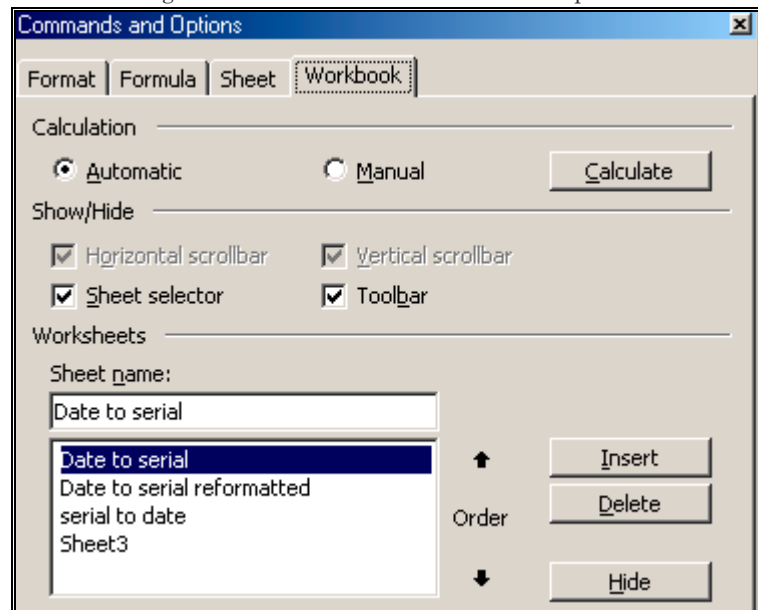
- Export to Excel
- Commands & Options
- Help

The second-from-right icon (“Commands & Options”) provides access to many features of the file. On selecting this icon, the dialog shown in the next figure opens.

The options in the tab “Workbook” provide access to features of the entire workbook. The order of the sheets can be changed using the up and down arrows to the right of the box that displays the sheet names.

A sheet can be deleted by selecting it in the box and then clicking on the “Delete” button.

Figure 231: Workbook Commands & Options



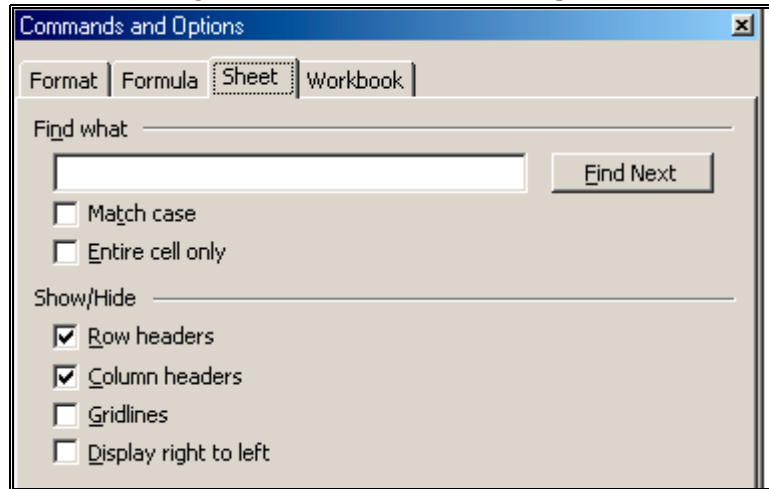
Similarly, a new sheet can be inserted before an existing sheet by clicking

on the button “Insert.” In the area “Show/Hide,” you can decide whether to view the arrow that permits the selection of a sheet.

The options in the tab “Sheet” (reproduced in the next figure), provide:

- Access to a “Find” utility
- Options for viewing the sheet in reverse order (right to left)
- Options for hiding row/column headers & Gridlines.

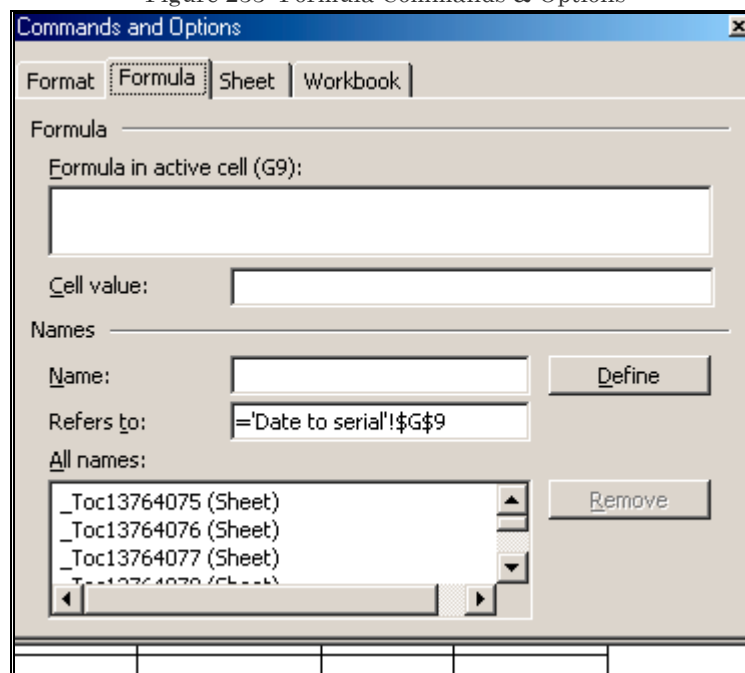
Figure 232: Sheet Commands & Options



The “Formula” tab provides access to formula editing. The area “Names” maps each cell to a “Location” on the file.

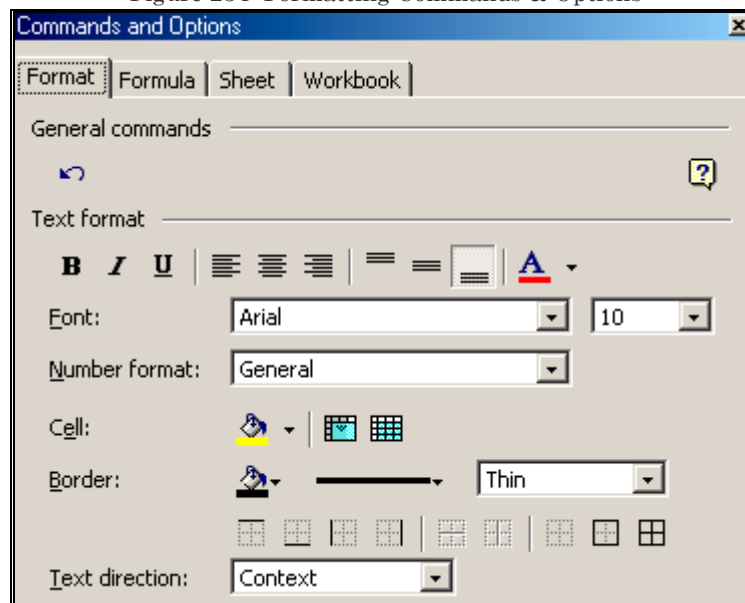
The formulas may reference these names instead of ranges. See 11.8 for more on “Named Ranges.”

Figure 233: Formula Commands & Options



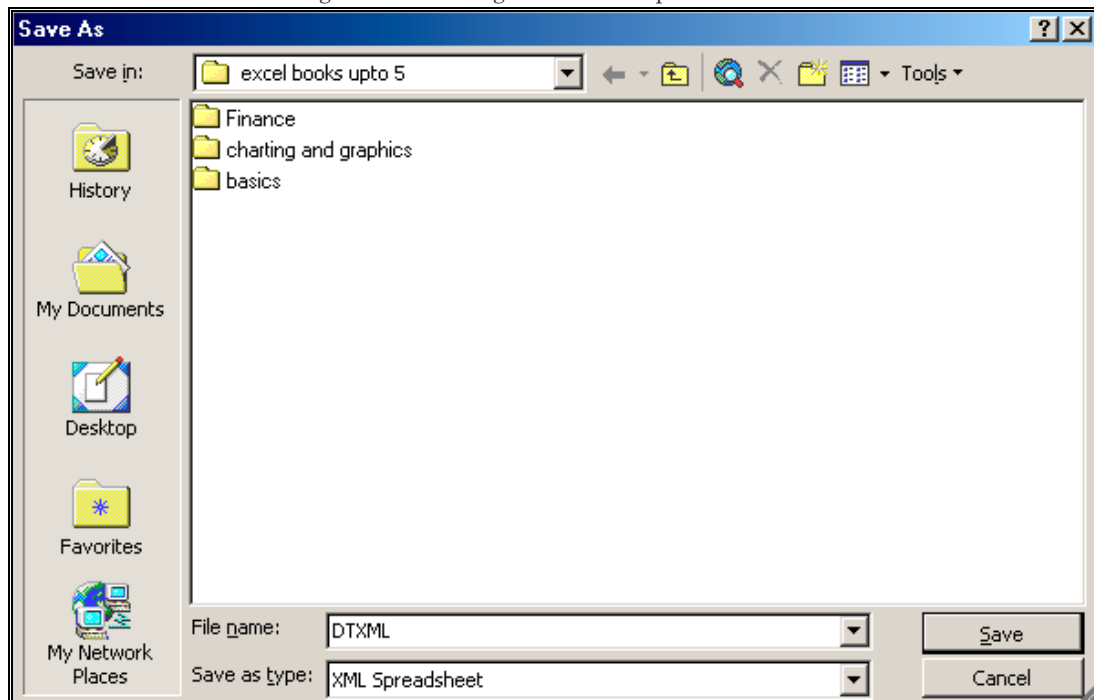
The “Format” tab provides access to the *Undo* command, and basic text and cell formatting. The dialog is reproduced in the next figure.

Figure 234: Formatting Commands & Options



An Excel workbook can also be saved as an “eXtended Markup Language” (XML) file.

Figure 235: Saving as an XML Spreadsheet



Note This format may gain in popularity because many other software companies are seeking to make XML compatibility a central feature of their products.

Detailed discussion of this topic is beyond the scope of this book.

CHAPTER 24

SELECTING ALL CELLS/CONTENT ACROSS THE WORKSHEET THAT SATISFY A CRITERION

This chapter teaches how to:

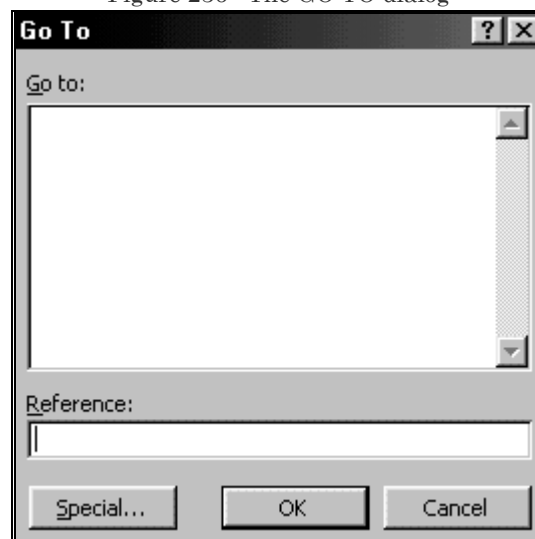
- USE “GO TO – SPECIAL”
- SELECT CELLS ON THE BASIS OF SPECIAL CRITERIA AND EXCEL FUNCTIONALITIES

24.1

THE “GO TO” OPTION

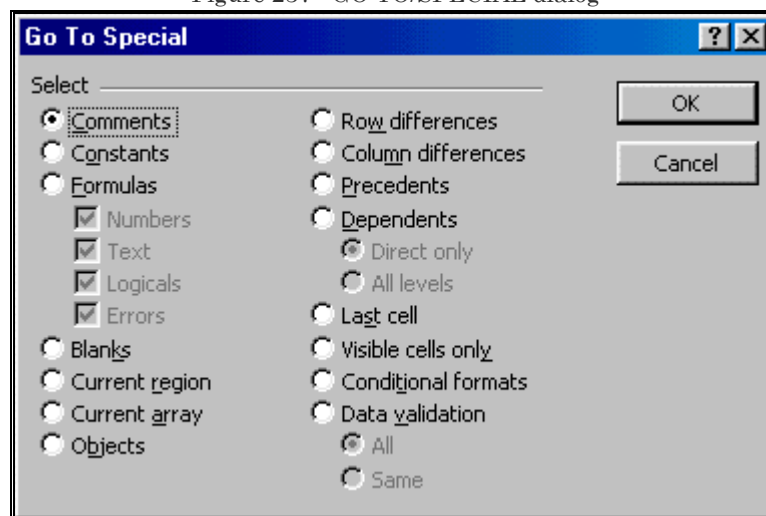
Excel’s “Go To- Special” feature allows you to make smart range selections without programming. Using the mouse, select the menu path EDIT/GO TO.

Figure 236: The GO TO dialog



Click on the button “Special.” The relevant dialog is shown in the next figure. The options inside this dialog (user-input form) allow smart range selection. The dialog is shown below.

Figure 237: GO TO/SPECIAL dialog



24.1.A

SELECTING CELLS WITH COMMENTS, EMPTY CELLS,
UNHIDDEN CELLS, CELLS IN THE CONTIGUOUS REGION OF THE
CURRENTLY ACTIVE CELL

- “Comments” selects all the comments (and their underlying cells) in the worksheet. You can choose to format all cells with comments with a comment cell formatting (font, patterns, etc), delete all comments, hide/autofit/size the rows or columns that contain the cells that have comments, or use other features only on the cells that contain comments. Excel displays a message if it cannot find any cell with a comment. This is a shortcut for determining if a worksheet has any comments.
- “Blanks” selects all the blanks in the data worksheet, including formatted but empty cells.
- “Current region” selects the region around the current cell. A region ends if Excel encounters blank rows or columns.
- “Last cell” selects the last cell that has content or formatting. A shortcut: press the key CNTRL, and, while the key is pressed, press the key END.

Assume you started with a large amount of data in a workbook. While working on the spreadsheet you cleared the contents of many cells/rows/columns, but Excel is not showing any reduction in file size. The reason may be that the “cleared” cells are still stored in memory because they have some formatting that was not “cleared.” You can use the “Last Cell” utility to determine whether Excel is still storing the “cleared” cells. (The solution is to select the “cleared” range(s) and using EDIT / DELETE to remove all content and formatting from the range(s).)

-
- “Visible cells only” selects all cells except those that are in hidden rows or columns. This feature is extremely useful if the purpose of hiding was to exclude rows/columns from certain procedures.

24.2

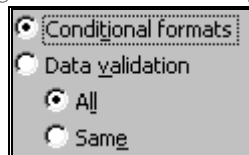
CONDITIONAL FORMATTING

This topic requires familiarity with “Conditional Formatting,” which is taught in Volume 1 and Volume 4. (*Excel for Beginners* and *Managing & tabulating Data in Excel*, respectively)

Conditional formats” and “All” selects all cells that have a conditional formatting defined on them. Once these cells are selected, you can:

1. Highlight them and place a marker like bold font on all the cells,
2. Remove the “Conditional: formats by going to **FORMAT/CONDITIONAL FORMATTING** and pressing on the button “Remove.”

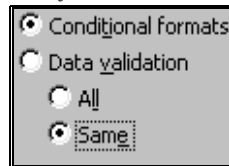
Figure 238: Selecting all cells that have any Conditional Formats



Conditional formats” and “Same” selects all cells that satisfy the same conditional formatting as the current cell. After making such a selection, you can conduct procedures specifically on these “criteria-satisfying” cells.

In fact, this selection utility enhances and extends (beyond the initial purpose) the usefulness of “Conditional Formatting” and “Data Validation.”

Figure 239: Selecting all cells that satisfy the same “conditional formatting” as the active cell



24.3

SELECTING BASED ON DATA VALIDATION

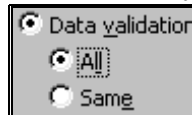
This topic requires knowledge about “Data Validation,” a topic taught in *Volume 4: Managing & Tabulating Data in Excel*.

Step 1:

Pick the menu option EDIT/GO TO, click on the button “Special.” Select the option “Data Validation” in the dialog that opens.

The option “All” selects all cells that have validation rules defined for validating data entry.

Figure 240: Selecting all cells that have any Data Validation Conditions

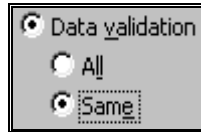


The option “Same” selects all cells that have the same validation rules (for validating data entry) as the current cell.

Step 2:

Select the scope of the selection – “All” or “Same.”

Figure 241: Selecting all cells that satisfy the same Data Validation rules as the active cell



24.4

SELECTING BASED ON FORMULAE

This topic requires knowledge about Functions and Error Values. These are taught in chapter 10 on page 120.

24.4.A

CONSTANTS

Step 1:

Pick the menu option EDIT/GO TO, click on the button “Special.” Select the option “Constants” in the dialog that opens. (See next figure.)

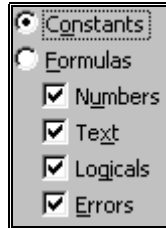
Constants” selects all named constants of the data type defined by the selected check boxes amongst the check boxes:

- Numbers
- Text
- Logicals
- Errors

Step 2:

Select one of these four options

Figure 242: Constants



24.4.B

FORMULA RESULTS

Step 1:

Pick the menu option EDIT/GO TO, click on the button “Special.” Select the option “Formulas” in the dialog that opens. (See next figure.)

“Formulas” selects all cells that have a formula and the formula result conforms to the data type chosen in this dialog. The data types conform to the four possible results of a formula:

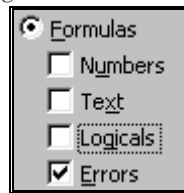
- Number
- Text
- Logical (True or False)
- (*Formula-*) *Errors* – the values (#N/A, #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?, and #NULL!)

-

Step 2:

Select one of these four options.

Figure 243: Formulas



Note:

Date and Time functions evaluate to a serial number that corresponds to a specific point on the time continuum. Thus, they are “Numbers.”

24.5

SELECTING BASED ON CELL REFERENCES IN FORMULAS

This topic requires knowledge about “Function Referencing” (refer to 10.2 on page 125) and” Formula Auditing” (refer to chapter 12 on page 149).

24.5.A

SELECTING ALL CELLS WHOSE FORMULAS REFERENCE THE ACTIVE CELL (DIRECTLY OR/AND INDIRECTLY)

You can select all the cells whose formula references the active cell. These formula cells are called “Dependents.”

Step 1:

Pick the menu option EDIT/GO TO, click on the button “Special.” Select the option “Dependents” in the dialog that opens. (See next figure.)

Step 2:

Select “Direct only” or “All levels” from the two buttons below the “Dependents” button.

- The option “Direct only” restricts the selection to cells directly referencing the current cell.
- The option “All levels” selects all cells that reference –however indirectly - the active cell.

Figure 244: Selecting all cells whose formula is dependent upon the value of the active cell

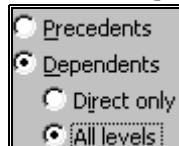
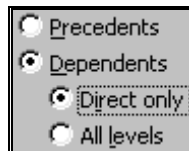


Figure 245: Selecting all cells whose formula has a direct reference to the active cell



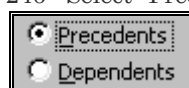
24.5.B SELECTING ALL CELLS REFERENCED (DIRECTLY OR/AND INDIRECTLY) BY THE FORMULA IN THE ACTIVE CELL

You can select all the cells that are used as references in the active cell's formula. These referenced cells are called “Precedents.”

Step 1:

Pick the menu option EDIT/GO TO, click on the button “Special.” Select the option “Precedents” in the dialog that opens.

Figure 246: Select “Precedents”



Step 2:

Select “Direct only” or “All levels” from the two buttons below the “Dependents” button.

- The option “Direct only” restricts the selection to only directly referenced cells – that is, the cells referenced by the formula in the current cell.
- The option “All levels” selects cells referenced directly or indirectly in the formula of the current cell. Indirect references are the cells referenced by the cells directly referenced by the formula in the current cell.

GO TO/SPECIAL can play a role as a search tool. For example, in the circumstance that no criterion-satisfying cell could be located, Excel displays a message with information to this effect.

For example, choosing the options shown in the next figure will tell you if any of the formulas return errors. (In addition, the selection facilitates easy deletion of error-containing cells.)

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