



FORMULAS AND FUNCTIONS:

Microsoft Excel 2010

MAKE FINANCIAL DECISIONS
MODEL YOUR BUSINESS
TRACK TRENDS
TROUBLESHOOT FORMULAS
MAKE FORECASTS
SOLVE COMPLEX PROBLEMS

QUE



FORMULAS AND FUNCTIONS

MICROSOFT® EXCEL 2010

Paul McFedries

que®

800 E. 96th Street
Indianapolis, Indiana 46240

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Formulas and Functions: Microsoft® Excel 2010

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Associate Publisher

Greg Wiegand

Acquisitions Editor

Loretta Yates

Development Editor

Sondra Scott

Managing Editor

Patrick Kanouse

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Copy Editor

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Technical Editor

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Designer

Ann Jones

Page Layout

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Dedication

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About the Author

Paul McFedries Paul McFedries is an Excel expert and full-time technical writer. Paul has been authoring computer books since 1991 and has more than 60 books to his credit, which combined have sold more than 3 million copies worldwide. His titles include the Que Publishing books *Tricks of the Microsoft Office 2007 Gurus*, *VBA for the 2007 Microsoft Office System*, *Networking with Microsoft Windows Vista*, and *Tweak It and Freak It: A Killer Guide to Making Windows Run Your Way*, as well as the Sams Publishing book *Windows 7 Unleashed*. Paul is also the proprietor of Word Spy (<http://www.wordspy.com>), a website devoted to *lexpionage*, the sleuthing of new words and phrases that have entered the English language. Please drop by Paul's personal website at <http://www.mcfedries.com> or follow Paul on Twitter at twitter.com/paulmcf.

Acknowledgments

Substitute damn every time you're inclined to write very; your editor will delete it and the writing will be just as it should be.

Mark Twain

I didn't follow Mark Twain's advice in this book (the word *very* appears throughout), but if my writing still appears "just as it should be," it's because of the keen minds and sharp linguistic eyes of the editors at Que. Near the front of the book you'll find a long list of the hard-working professionals whose fingers made it into this particular paper pie. However, there are a few folks whom I worked with directly, so I'd like to single them out for extra credit. A big, heaping helping of thanks goes out to Acquisitions Editor Loretta Yates, Development Editor Sondra Scott, Project Editor Mandie Frank, Copy Editor Keith Cline, and Technical Editor P K Hari.

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The old 80/20 rule for software—that 80% of a program’s users use only 20% of a program’s features—doesn’t apply to Microsoft Excel. Instead, this program probably operates under what could be called the 95/5 rule: Ninety-five percent of Excel users use a mere 5% of the program’s power. On the other hand, most people *know* that they could be getting more out of Excel if they could only get a leg up on building formulas and using functions. Unfortunately, this side of Excel appears complex and intimidating to the uninitiated, shrouded as it is in the mysteries of mathematics, finance, and impenetrable spreadsheet jargon.

If this sounds like the situation you find yourself in, and if you’re a businessperson who *needs* to use Excel as an everyday part of your job, you’ve come to the right book. In *Formulas and Functions with Microsoft Excel 2010*, I demystify the building of worksheet formulas and present the most useful of Excel’s many functions in an accessible, jargon-free way. This book not only takes you through Excel’s intermediate and advanced formula-building features, but it also tells you *why* these features are useful to you and shows you *how* to use them in everyday situations and real-world models. This book does all this with no-nonsense, step-by-step tutorials and lots of practical, useful examples aimed directly at business users.

Even if you’ve never been able to get Excel to do much beyond storing data and adding a couple of numbers, you’ll find this book to your liking. I show you how to build useful, powerful formulas from the ground up, so no experience with Excel formulas and functions is necessary.

INTRODUCTION

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What's in the Book

This book isn't meant to be read from cover to cover, although you're certainly free to do just that if the mood strikes you. Instead, most of the chapters are set up as self-contained units that you can dip into at will to extract whatever nuggets of information you need. However, if you're a relatively new Excel user, I suggest starting with Chapters 1, "Getting the Most Out of Ranges"; Chapter 2, "Using Range Names"; Chapter 3, "Building Basic Formulas"; and Chapter 6, "Using Functions"—to ensure that you have a thorough grounding in the fundamentals of Excel ranges, formulas, and functions.

The book is divided into four main parts. To give you the big picture before diving in, here's a summary of what you'll find in each part:

- **Part I, "Mastering Excel Ranges and Formulas"**—The five chapters in Part I tell you just about everything you need to know about building formulas in Excel. Starting with a thorough look at ranges (crucial for mastering formulas), this part also discusses operators, expressions, advanced formula features, and formula-troubleshooting techniques.
- **Part II, "Harnessing the Power of Functions"**—Functions take your formulas to the next level, and you'll learn all about them in Part II. After you see how to use functions in your formulas, you examine the eight main function categories—text, logical, information, lookup, date, time, math, and statistical. In each case, I tell you how to use the functions and give you lots of practical examples that show you how you can use the functions in everyday business situations.
- **Part III, "Building Business Models"**—The five chapters in Part III are all business as they examine various facets of building useful and robust business models. You learn how to analyze data with Excel tables and pivot tables, how to use what-if analysis and Excel's Goal Seek and scenarios features, how to use powerful regression-analysis techniques to track trends and make forecasts, and how to use the amazing Solver feature to solve complex problems.
- **Part IV, "Building Financial Formulas"**—The book finishes with more business goodies related to performing financial wizardry with Excel. You learn techniques and functions for amortizing loans, analyzing investments, and using discounting for business case and cash-flow analysis.

This Book's Special Features

Formulas and Functions with Microsoft Excel 2010 is designed to give you the information you need without making you wade through ponderous explanations and interminable technical background. To make your life easier, this book includes various features and conventions that help you get the most out of the book and Excel itself:

- **Steps**—Throughout the book, each Excel task is summarized in step-by-step procedures.

- **Things you type**—Whenever I suggest that you type something, what you type appears in a **bold** font.
- **Commands**—I use the following style for Excel menu commands: File, Open. This means that you pull down the File menu and select the Open command.
- **Dialog box controls**—Dialog box controls have underlined accelerator keys: Close.
- **Functions**—Excel worksheet functions appear in capital letters and are followed by parentheses: `SUM()`. When I list the arguments you can use with a function, optional arguments appear surrounded by square brackets: `CELL(info_type [, reference])`.
- **Code-continuation character** (**↳**)—When a formula is too long to fit on one line of this book, it's broken at a convenient place, and the code-continuation character appears at the beginning of the next line.

This book also uses the following boxes to draw your attention to important (or merely interesting) information.

NOTE

The Note box presents asides that give you more information about the topic under discussion. These tidbits provide extra insights that give you a better understanding of the task at hand.

TIP

The Tip box tells you about Excel methods that are easier, faster, or more efficient than the standard methods.

CAUTION

The all-important Caution box tells you about potential accidents waiting to happen. There are always ways to mess things up when you're working with computers. These boxes help you avoid at least some of the pitfalls.

→ These cross-reference elements point you to related material elsewhere in the book.

You'll find these case studies throughout the book, and they're designed to take what you've learned and apply it to projects and real-world examples.



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Getting the Most Out of Ranges

Other than performing data-entry chores, you probably spend most of your Excel life working with ranges in some way. Whether you're copying, moving, formatting, naming, or filling them, ranges are a big part of Excel's day-to-day operations. And why not? After all, working with a range of cells is a lot easier than working with each cell individually. For example, suppose that you want to know the average of a column of numbers running from B1 to B30. You *could* enter all 30 cells as arguments in the AVERAGE function, but you probably have a life to lead away from your computer screen. Typing =AVERAGE(B1:B30) is decidedly quicker, and probably more accurate.

In other words, ranges save time, and they save wear and tear on your typing fingers. However, there are more to ranges than that. Ranges are powerful tools that can unlock the hidden power of Excel. So, the more you know about ranges, the more you'll get out of your Excel investment, particularly when it comes to building formulas. This chapter takes you beyond the range routine and shows you some techniques for taking full advantage of Excel's range capabilities.

Advanced Range-Selection Techniques

As you work with Excel, you'll come across three situations when you'll need to select a cell range:

- When a dialog box field requires a range input
- While entering a function argument
- Before selecting a command that uses a range input

In a dialog box field or function argument, the most straightforward way to select a range is to enter the

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range coordinates by hand. You do this by typing the address of the upper-left cell, (called the *anchor cell*), followed by a colon, and then the address of the lower-right cell. To use this method, either you must be able to see the range you want to select or you must know in advance the range coordinates you want. Because this is often not the case, most people don't type the range coordinates directly; instead, they select ranges using either the mouse or the keyboard.

This chapter assumes you know the basic, garden-variety range-selection techniques. Therefore, the next few sections show a few advanced techniques that can make your selection chores faster and easier.

Mouse Range-Selection Tricks

Keep these handy techniques in mind when using a mouse to select a range:

- When selecting a rectangular, contiguous range, if you select the wrong lower-right corner, your range will be either too big or too small. To fix it, hold down the Shift key and click the correct lower-right cell. The range adjusts automatically.
- After selecting a large range, you no longer see the active cell because you may have scrolled it off the screen. If you need to see the active cell before continuing, you can either use the scrollbars to bring it into view or press Ctrl+backspace.
- You can use Excel's Extend mode as an alternative method for using the mouse to select a rectangular, contiguous range. Click the upper-left cell of the range you want to select, press F8 to enter Extend mode (you see *Extend Selection* in the status bar), and then click the lower-right cell of the range. Excel selects the entire range. Press F8 again to turn off Extend mode.
- If the cells you want to work with are scattered willy-nilly throughout the sheet, you need to combine them into a noncontiguous range. The secret to defining a noncontiguous range is to hold down the Ctrl key while selecting the cells. That is, you first select the cell or range you want to include in the noncontiguous range, press and hold down the Ctrl key, and then select the other cells or rectangular ranges you want to include in the noncontiguous range.

CAUTION

When you are selecting a noncontiguous range, always press and hold down the Ctrl key after you have selected your first cell or range. Otherwise, Excel includes the currently selected cell or range as part of the noncontiguous range. This action could create a circular reference in a function if you are defining the range as one of the function's arguments.

→ If you're not sure what a "circular reference" is, see "Fixing Circular References," p. 116.

Keyboard Range-Selection Tricks

Excel comes with a couple of tricks to make selecting a range via the keyboard easier or more efficient:

- If you want to select a contiguous range that contains data, there's an easier way to select the entire range. First, move to the upper-left cell of the range, and then press Ctrl+Shift+End.
- If the range you select is so large that all the cells don't fit on the screen, you can scroll through the selected cells by activating the Scroll Lock key. When Scroll Lock is on, pressing the arrow keys (or Page Up and Page Down) scrolls you through the cells while keeping the selection intact.



Working with 3D Ranges

A *3D range* is a range selected on multiple worksheets. This is a powerful concept because it means that you can select a range on two or more sheets and then enter data, apply formatting, or give a command, and the operation will affect all the ranges simultaneously. This proves useful when you're working with a multisheet model where some or all the labels are the same on each sheet. For example, in a workbook of expense calculations where each sheet details the expenses from a different division or department, you might want the label "Expenses" to appear in cell A1 on each sheet.

To create a 3D range, first you need to group the worksheets you want to work with. To select multiple sheets, use any of the following techniques:

- To select adjacent sheets, click the tab of the first sheet, hold down the Shift key, and click the tab of the last sheet.
- To select nonadjacent sheets, hold down the Ctrl key and click the tab of each sheet you want to include in the group.
- To select all the sheets in a workbook, right-click any sheet tab and click the Select All Sheets command.

When you've selected your sheets, each tab is highlighted and [Group] appears in the workbook title bar. To ungroup the sheets, click a tab that isn't in the group. Alternatively, you can right-click one of the group's tabs and select the Ungroup Sheets command from the shortcut menu.

With the sheets now grouped, you create your 3D range by activating any of the grouped sheets and then selecting a range. Excel selects the same cells in all the other sheets in the group.

You can also type in a 3D range by hand when, say, entering a formula. Here's the general format for a 3D reference:

FirstSheet:LastSheet!ULCorner:LRCorner

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