

Microsoft Excel 2019

Formulas and Functions



Sample files on the web



Microsoft Excel 2019 Formulas and Functions

Paul McFedries

Microsoft Excel 2019 Formulas and Functions

Table of Contents

Cover

Title Page

Copyright Page

Contents at a Glance

Contents

Acknowledgments

About the author

Introduction

Part I: Mastering Excel formulas

Chapter 1 Building basic formulas

Understanding formula basics

Formula limits in Excel 2019

Entering and editing formulas

Using arithmetic formulas

Using comparison formulas

Using text formulas

Using reference formulas

Understanding operator precedence

The order of precedence

Controlling the order of precedence

Controlling worksheet calculation

Copying and moving formulas

Understanding relative reference format



Understanding absolute reference format

Copying a formula without adjusting relative references

Displaying worksheet formulas

Displaying all worksheet formulas

Displaying a cells formula by using FORMULATEXT()

Converting a formula to a value

Working with range names in formulas

Pasting a name into a formula

Applying names to formulas

Naming formulas

Working with links in formulas

Understanding external references

Updating links

Changing the link source

Chapter 2 Creating advanced formulas

Working with arrays

Using array formulas

Using array constants

Functions that use or return arrays

Using iteration and circular references

Consolidating multisheet data

Consolidating by position

Consolidating by category

Applying data-validation rules to cells

Using dialog box controls on a worksheet

Displaying the Developer tab

Using the form controls

Adding a control to a worksheet

Linking a control to a cell value

Understanding the worksheet controls

Chapter 3 Troubleshooting formulas

Understanding Excels error values



#CALC!
#DIV/0!
#FIELD!
#N/A
#NAME?
Avoiding #NAME? errors when deleting range names
#NULL!
#NUM!
#REF!
#SPILL!
#UNKNOWN!

Fixing other formula errors

Missing or mismatched parentheses

Erroneous formula results

Fixing circular references

Handling formula errors with IFERROR()

Using the formula error checker

Choosing an error action

Setting error checker options

Auditing a worksheet

Understanding auditing

Tracing cell precedents

Tracing cell dependents

Tracing cell errors

Removing tracer arrows

Evaluating formulas

Watching cell values

Part II: Harnessing the power of functions

Chapter 4 Understanding functions

About Excels functions

The structure of a function



Typing a function into a formula

Using the Insert Function feature

Loading the Analysis ToolPak

Chapter 5 Working with text functions

Excels text functions

Working with characters and codes

The CHAR() function

The CODE() function

Converting text

The LOWER() function

The UPPER() function

The PROPER() function

The NUMBERVALUE() function

Formatting text

The DOLLAR() function

The FIXED() function

The TEXT() function

Displaying when a workbook was last updated

Manipulating text

Removing unwanted characters from a string

The TEXTJOIN() function: Concatenating text with a delimiter

The REPT() function: Repeating a character or string

Extracting a substring

Converting text to sentence case

A date-conversion formula

Searching for substrings

The FIND() and SEARCH() functions

Extracting a first name or last name

Extracting first name, last name, and middle initial

Determining the column letter

Substituting one substring for another

The REPLACE() function



The SUBSTITUTE() function

Removing a character from a string

Removing two different characters from a string

Removing line feeds

Chapter 6 Working with logical and information functions

Adding intelligence with logical functions

Using the IF() function

Performing multiple logical tests

Combining logical functions with arrays

Getting data with information functions

The CELL() function

The ERROR.TYPE() function

The INFO() function

The SHEET() and SHEETS() functions

The IS functions

Chapter 7 Working with lookup functions

Taking a look at Excels lookup functions

Understanding lookup tables

The CHOOSE() function

Determining the name of the day of the week

Determining the month of the fiscal year

Calculating weighted questionnaire results

Integrating CHOOSE() and worksheet option buttons

Looking up values in tables

The VLOOKUP() function

The HLOOKUP() function

Returning a customer discount rate with a range lookup

Returning a tax rate with a range lookup

Finding exact matches

Advanced lookup operations

The MATCH() and INDEX() functions

Chapter 8 Working with date and time functions



How Excel deals with dates and times

Entering dates and times

Excel and two-digit years

Using Excels date functions

Returning a date

Returning parts of a date

Calculating the difference between two dates

Using Excels time functions

Returning a time

Returning parts of a time

Calculating the difference between two times

Chapter 9 Working with math functions

Excels math and trig functions

Understanding Excels rounding functions

The ROUND() function

The MROUND() function

The ROUNDDOWN() and ROUNDUP() functions

The CEILING.MATH() and FLOOR.MATH() functions

Calculating Easter dates

The EVEN() and ODD() functions

The INT() and TRUNC() functions

Using rounding to prevent calculation errors

Summing values

The SUM() function

The SUMIF() function

Summing only the positive or negative values in a range

The SUMIFS() function

Calculating cumulative totals

The MOD() function

A better formula for time differences

Summing every nth row

Determining whether a year is a leap year

Creating ledger shading



Generating random numbers

The RAND() function

The RANDBETWEEN() function

The RANDARRAY() function

Creating increasing random numbers with the SEQUENCE() function

Part III: Building business formulas

Chapter 10 Implementing basic business formulas

Pricing formulas

Price markups

Price discounts

Break-even point

Financial formulas

Sales ratios

Cost of goods sold

Gross margin

Net margin

Fixed-asset ratios

Inventory formulas

Inventory ratios

Inventory management formulas

Liquidity formulas

Accounts receivable ratios

Accounts payable ratios

Working capital

Liquidity ratios

Liquidity index

Chapter 11 Building descriptive statistical formulas

Understanding descriptive statistics

Counting items

The COUNT() function

The COUNTA() function

The COUNTBLANK() function



The COUNTIF() function

The COUNTIFS() function

Calculating averages

The AVERAGE() function

The AVERAGEIF() function

The AVERAGEIFS() function

The MEDIAN() function

The MODE() function

Calculating the weighted mean

Calculating extreme values

The MAX() and MIN() functions

The LARGE() and SMALL() functions

Performing calculations on the top k values

Performing calculations on the bottom k values

Working with rank and percentile

Calculating rank

Calculating percentile

Calculating measures of variation

Calculating the range

Calculating the variance

Calculating the standard deviation

Working with frequency distributions

Chapter 12 Building inferential statistical formulas

Understanding inferential statistics

Sampling data

Extracting a periodic sample

Extracting a random sample

Determining whether two variables are related

Calculating covariance

Calculating correlation

Working with probability distributions

Calculating probability



Discrete probability distributions

Understanding the normal distribution and the NORM.DIST() function

Determining confidence intervals

Hypothesis testing

Chapter 13 Applying regression to track trends and make forecasts

Choosing a regression method

Using simple regression on linear data

Analyzing trends using best-fit lines

Making forecasts

Using simple regression on nonlinear data

Working with an exponential trend

Working with a logarithmic trend

Working with a power trend

Using polynomial regression analysis

Using multiple regression analysis

Chapter 14 Building loan formulas

Understanding the time value of money

Calculating a loan payment

Loan payment analysis

Working with a balloon loan

Calculating interest costs, part I

Calculating the principal and interest

Calculating interest costs, part II

Calculating cumulative principal and interest

Building a loan amortization schedule

Building a fixed-rate amortization schedule

Building a dynamic amortization schedule

Calculating the term of a loan

Calculating the interest rate required for a loan

Calculating how much you can borrow

Chapter 15 Working with investment formulas



Working with interest rates

Understanding compound interest

Nominal versus effective interest

Converting between the nominal rate and the effective rate

Calculating the future value

The future value of a lump sum

The future value of a series of deposits

The future value of a lump sum plus deposits

Working toward an investment goal

Calculating the required interest rate

Calculating the required number of periods

Calculating the required regular deposit

Calculating the required initial deposit

Calculating the future value with varying interest rates

Chapter 16 Building discount formulas

Calculating the present value

Taking inflation into account

Calculating present value using PV()

Income investing versus purchasing a rental property

Buying versus leasing

Discounting cash flows

Calculating the net present value

Calculating net present value using NPV()

Net present value with varying cash flows

Net present value with nonperiodic cash flows

Calculating the payback period

Simple undiscounted payback period

Exact undiscounted payback point

Discounted payback period

Calculating the internal rate of return

Using the IRR() function

Calculating the internal rate of return for nonperiodic cash flows

Calculating multiple internal rates of return



Part IV: Building business models

Chapter 17 Analyzing data with tables

Sorting a table

Sorting on part of a field

Sorting without articles

Sorting table data into an array, part I: The SORT() function

Sorting table data into an array, part II: The SORTBY() function

Filtering table data

Using complex criteria to filter a table

Entering computed criteria

Filtering table data with the FILTER() function

UNIQUE()

Referencing tables in formulas

Using table specifiers

Entering table formulas

Excels table functions

About table functions

Using DAVERAGE()

Using DGET()

Chapter 18 Analyzing data with PivotTables

Working with PivotTable subtotals

Hiding PivotTable grand totals

Hiding PivotTable subtotals

Customizing the subtotal calculation

Changing the value field summary calculation

Using a difference summary calculation

Toggling the difference calculation with VBA

Using a percentage summary calculation

Using a running total summary calculation

Using an index summary calculation

Creating custom PivotTable calculations

Creating a calculated field



Creating a calculated item

Using PivotTable results in a worksheet formula

Chapter 19 Using Excels business modeling tools

Using what-if analysis

Setting up a one-input data table

Adding more formulas to the input table

Setting up a two-input data table

Editing a data table

Working with Goal Seek

How does Goal Seek work?

Running Goal Seek

Optimizing product margin

A note about Goal Seeks approximations

Performing a break-even analysis

Solving algebraic equations

Working with scenarios

Understanding scenarios

Setting up your worksheet for scenarios

Adding a scenario

Displaying a scenario

Editing a scenario

Merging scenarios

Generating a summary report

Deleting a scenario

Chapter 20 Solving complex problems with Solver

Some background on Solver

The advantages of Solver

When do you use Solver?

Loading Solver

Using Solver

Adding constraints

Saving a solution as a scenario



Setting other Solver options

Selecting the method Solver uses

Controlling how Solver works

Working with Solver models

Making sense of Solvers messages

Displaying Solvers reports

The Answer report

The Sensitivity report

The Limits report

Index

