Excel Challenge No 2: Monty Hall Problem

Level: Expert Skills

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Excel Challenge No 2: The Monty Hall Problem

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Challenge overview

The Monty Hall problem is one that has caused a great deal of controversy over the years. In 1991 it was so hotly debated that the New York Times ran a front-page feature on the subject. The debate began when a letter was written to Parade magazine with the following puzzle:

Suppose you're on a game show, and you're given the choice of three doors. Behind one door is a car, behind the others, goats. You pick a door, say #1, and the host, who knows what's behind the doors, opens another door, say #3, which has a goat. He says to you, "Do you want to pick door #2?" Is it to your advantage to switch your choice of doors?

This is called the "Monty Hall" problem because the scenario is quite similar to the game show "Let's Make a Deal", which was hosted by Monty Hall until 1991.

Marilyn vos Savant, who wrote Parade's "Ask Marilyn" column, asserted that picking door #2 is the correct answer, but the magazine received over 10,000 letters from people who thought she was wrong!

In this challenge you'll use Excel to prove who had the correct answer by running 50 simulated games and comparing *Player 1*, who always sticks with their original choice with *Player 2*, who always changes their answer.

You'll begin with an almost ccompletely empty worksheet and end with a worksheet that shows all 50 simulated games and each player's scores.

	A	B	C	D	E	F	G	H	I
1	Monty Hall Problem								
2									
3	Correct Door	First Choice	First Choice Correct?	Player 1	Player 2		Player 1 Score	20	
4	2	2	TRUE	TRUE	FALSE		Player 2 Score	30	
5	3	2	FALSE	FALSE	TRUE				
6	1	2	FALSE	FALSE	TRUE				
7	1	1	TRUE	TRUE	FALSE				
8	2	3	FALSE	FALSE	TRUE				
9	1	1	TRUE	TRUE	FALSE				
10	1	2	FALSE	FALSE	TRUE				
11	3	3	TRUE	TRUE	FALSE				
12	1	3	FALSE	FALSE	TRUE				
13	3	1	FALSE	FALSE	TRUE				
14	3	3	TRUE	TRUE	FALSE				
15	1	1	TRUE	TRUE	FALSE				
16	1	2	FALSE	FALSE	TRUE				

You can complete this challenge using nothing but Excel's built in formulas and a few of the functions in Excel's vast function library.

Writing formulas is covered in our free *Basic Skills* course, but in order to have a prior in-depth knowledge of the functions that are needed to complete this challenge, you will find it useful to work through the *Advanced Functions* session in the *Expert Skills* course.

Estimated time to complete this challenge: 2 minutes

The solution video shows this task being completed in the estimated time shown above.

It is interesting to compare the time a trained Excel user can complete a simple task when compared to an untrained user. An untrained user could spend many hours figuring out how to complete this task (if they were able to complete it at all) and would probably attempt it in an unnecessarily complex way.

You can use this challenge in two ways

As an *Excel Expert Skills* Trained User

This challenge is graded: *Expert Skills*

This means that if you've completed the *Essential Skills* tutorial and the *Advanced Functions* session in the *Expert Skills* tutorial you should have the skills you need to complete this challenge.
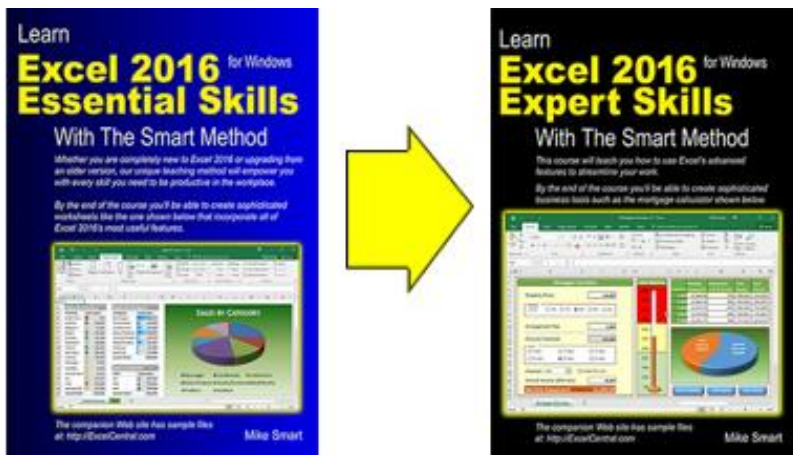
The *Essential Skills* book/e-book is designed for learners who have never used Excel before and who need Excel skills to get a job. The course is designed to give students all the skills an employer would expect. After completing the *Essential Skills* course students will have acquired Excel skills that are better than those of most office workers.

Some of the functions needed to complete this challenge are not explicitly covered in the Essential Skills course but are in the *Advanced Functions* session in the *Expert Skills* course.

While the books/e-books teach all the techniques needed to complete this challenge it is possible that students may lack the experience needed to identify the best approach to completing this challenge.

The *Essential* and *Expert Skills* books already include an exercise with answers at the end of each session.

Our Excel challenges take things to the next level and are far more involved than the exercises presented in the books. Challenges are designed to allow users to test their ability to apply some of the Excel skills taught in the books/e-books.

As an Excel user wishing to test their existing skills

If you are self-taught or have acquired your Excel skills from a classroom course, or by other means, you may well have the skills needed to complete this challenge.

Completing the challenge will reassure you that you have excellent Excel skills. You can see a list of all the skills that are taught in the *Essential Skills* and *Expert Skills* books in: *Appendix A: Skills Covered in the Essential Skills Course* and *Appendix B: Skills Covered in the follow-on Expert Skills Course* at the end of this book.

Contents

Support, Feedback and Sample Files

Support

If you encounter any problem downloading the free sample file you can contact us for free support at:

https://thesmartmethod.com/contact/

We'll do everything possible to quickly resolve the problem.

The Challenge Solution Video and Workbook

For assistance in completing the challenge you should first refer to the *Challenge Solution Video* and *Solution Video and Workbook* (available from https://thesmartmethod.com). If you are still unable to complete the challenge after using these resources, you can contact us for support using the same contact link above and we'll assist in every way we can.
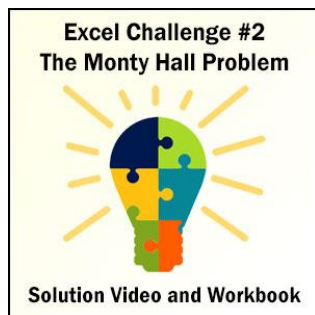
Feedback

At The Smart Method® we love feedback – both positive and negative. If you have any suggestions for improvements to future versions of this challenge, or if you find content or typographical errors, the author would always love to hear from you.

You can make suggestions for improvements to this book using the online form at:

https://thesmartmethod.com/contact/

Future editions of this challenge will always incorporate your feedback so that there are never any known errors at time of publication.

If you have any difficulty understanding the challenge, working through the step-by-step challenge solution video tutorial, or if you feel that anything could have been more clearly explained, we'd also love to hear from you. We've made hundreds of detail improvements to our books based upon reader's feedback and continue to chase the impossible goal of 100% perfection.

Downloading the free sample file

Before beginning this challenge you will find it useful to download an Excel workbook that contains the starting point of the challenge. You'll find a free file available for instant download at:

https://TheSmartMethod.com

Challenge Description

Challenges are graded at three levels of difficulty: *Basic Skills, Essential Skills* and *Expert Skills.*

If you've completed the *Essential Skills* tutorial and the *Advanced Functions* session in the *Expert Skills* tutorial you should have the skills you need to complete this challenge.

Challenges

There are six incremental challenges detailed in the following pages:

1. Download the sample file and open it in Excel

2. Add formulas to randomly generate the Correct Door and First Choice values

3. Add a formula to check whether the First Choice was correct

4. Add formulas to show if Player 1 or Player 2 chose the correct door

5. Fill down formulas to simulate 50 games

6. Add formulas to calculate the total scores of each player

Challenge 1: Download the sample file and open it in Excel

To save you time typing in the data you can download this sample file that has the starting point for the challenge.

You can download the file from https://TheSmartMethod.com.

	A	B	C	D	E	F	G	H	I
1	Monty Hall Problem								
2									
3	Correct Door	First Choice	First Choice Correct?	Player 1	Player 2		Player 1 Score	0	
4	2	1	FALSE	FALSE	TRUE		Player 2 Score	1	
5									
6									

This workbook contains sample data to illustrate how the workbook is going to work when it is finished. None of the cells contain any formulas at present; this is only sample data.

In the example you can see the following things:

- The *Correct Door* was door #2.

- The player's *First Choice* was door #1.

- The player's first choice was not correct (FALSE).

- *Player 1*, who never changes their first choice would have been incorrect in this case (FALSE).

- *Player 2*, who always changes their first choice, would have been correct (TRUE).

- Because *Player 1* was incorrect, the *Player 1 Score* is currently 0.

- Because *Player 2* was correct, the *Player 2 Score* is currently 1.

In the final version you will add formulas to enable all of these values to be calculated automatically and simulate 50 individual tests to see whether *Player 1* or *Player 2* gets a higher total score.

Challenge 2: Add formulas to randomly generate the Correct Door and First Choice values

Remove the test data from the worksheet and add formulas to cells A4 and B4 that generate random numbers between 1 and 3.

Your worksheet should now look like this (of course, your random numbers will probably be different):

	A	B	C	D	E	F	G	H
1	Monty Hall Problem							
2								
3	Correct Door	First Choice	First Choice Correct?	Player 1	Player 2		Player 1 Score	
4	3	1					Player 2 Score	
5								

After you've added the formulas, you can recalculate the random numbers by clicking **Formulas→Calculation→Calculate Now** or by pressing the **<F9>** key. New random numbers are generated each time you do this.

Tasks

1. Clear the contents of cells A4:E4 and H3:H4.

2. Add formulas to cells A4 and B4 that generate random numbers between 1 and 3.

Estimated time: 25 seconds

The solution video shows this task being completed in the estimated time shown above.

Challenge 3: Add a formula to check whether the First Choice was correct

Add a formula to cell C4 that will return TRUE if the *Correct Door* and *First Choice* are the same and FALSE if they are not.

Your worksheet should now look like this:

	A	B	C	D	E	F	G	H
1	Monty Hall Problem							
2								
3	Correct Door	First Choice	First Choice Correct?	Player 1	Player 2		Player 1 Score	
4	2	3	FALSE				Player 2 Score	
5								

As with the previous step, you can recalculate the random numbers by pressing the **<F9>** key. You can test whether your formula is working by pressing **<F9>** until the two random numbers match.

Hint

The fastest way to do this doesn't require the use of any functions at all.

Estimated time: 7 seconds

The solution video shows this task being completed in the estimated time shown above.

Challenge 4: Add formulas to show if Player 1 or Player 2 chose the correct door

Add formulas to cells D4 and E4 that return TRUE if the player chose correctly and FALSE if they chose incorrectly.

Your workbook should now look like this:

◢	A	B	C	D	E	F	G	H
1	Monty Hall Problem							
2								
3	Correct Door	First Choice	First Choice Correct?	Player 1	Player 2		Player 1 Score	
4	2	3	FALSE	FALSE	TRUE		Player 2 Score	
5								

Tasks

1. Add a formula to cell D4 that will show TRUE if *Player 1* chose the correct door and FALSE if they did not.

2. Add a formula to cell E4 that will show TRUE if *Player 2* chose the correct door and FALSE if they did not.

Hint

Remember that *Player 1* never changes their first choice and *Player 2* always changes their choice.

Estimated time: 16 seconds

The solution video shows this task being completed in the estimated time shown above.

Challenge 5: Fill down formulas to simulate 50 games

Fill the formulas in cells A4:E4 down to cells A53:E53 to simulate 50 games.

Your worksheet should now look like this:

	A	B	C	D	E	F	G	H
1	Monty Hall Problem							
2								
3	Correct Door	First Choice	First Choice Correct?	Player 1	Player 2		Player 1 Score	
4	2	2	TRUE	TRUE	FALSE		Player 2 Score	
5	3	1	FALSE	FALSE	TRUE			
6	2	2	TRUE	TRUE	FALSE			
7	2	3	FALSE	FALSE	TRUE			
8	1	1	TRUE	TRUE	FALSE			
9	1	1	TRUE	TRUE	FALSE			
10	1	3	FALSE	FALSE	TRUE			
11	1	1	TRUE	TRUE	FALSE			
12	3	2	FALSE	FALSE	TRUE			
13	1	3	FALSE	FALSE	TRUE			
14	1	1	TRUE	TRUE	FALSE			
15	2	2	TRUE	TRUE	FALSE			
16	1	3	FALSE	FALSE	TRUE			
17	3	2	FALSE	FALSE	TRUE			
18	1	3	FALSE	FALSE	TRUE			

If all your formulas are correct, each row will have different randomly-generated numbers, resulting in different outcomes each time.

Estimated time: 13 seconds

The solution video shows this task being completed in the estimated time shown above.

Challenge 6: Add formulas to calculate the total scores of each player

You could manually read through each of the 50 tests and calculate the total scores, but of course Excel can do this automatically.

Add formulas to cells H3 and H4 that will return the total number of times each player chose the correct door (each TRUE value).

Your final worksheet should look like this (your totals will be different):

	A	B	C	D	E	F	G	H	I
1	Monty Hall Problem								
2									
3	Correct Door	First Choice	First Choice Correct?	Player 1	Player 2		Player 1 Score	16	
4	3	1	FALSE	FALSE	TRUE		Player 2 Score	34	
5	2	1	FALSE	FALSE	TRUE				
6	1	1	TRUE	TRUE	FALSE				
7	2	1	FALSE	FALSE	TRUE				
8	3	3	TRUE	TRUE	FALSE				
9	3	1	FALSE	FALSE	TRUE				
10	3	3	TRUE	TRUE	FALSE				
11	2	3	FALSE	FALSE	TRUE				
12	3	2	FALSE	FALSE	TRUE				
13	1	2	FALSE	FALSE	TRUE				
14	1	1	TRUE	TRUE	FALSE				
15	2	1	FALSE	FALSE	TRUE				

You can press the **<F9>** key to regenerate the 50 tests as many times as you wish. You will find that *Player 2* consistently does better than *Player 1*, proving that Marilyn was correct and 10,000 of her readers were wrong!

Tasks

1. Add a formula to cell H3 that returns the total number of TRUE values in cells D4:D53.

2. Add a formula to cell H4 that returns the total number of TRUE values in cells E4:E53.

Hint

You will need to use a function for this calculation.

Estimated time: 34 seconds

The solution video shows this task being completed in the estimated time shown above.

A

Appendix A: Skills Covered in the Essential Skills Course

Our Excel Challenges are graded *Basic Skills*, *Essential Skills* and *Expert Skills.*

This is an Essential Skill challenge, meaning that it should be possible to complete the challenge using only the skills outlined in the Essential Skills book/e-book.
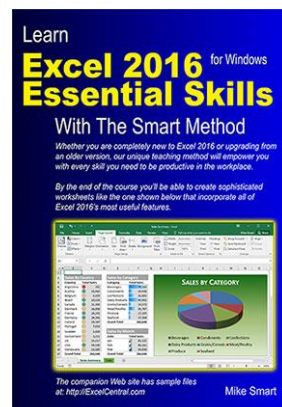
ISBN: 978-1-909253-08-7
(371 pages).

This appendix lists the lessons contained in the eight sessions that make up the *Essential Skills* book.

Learn Excel 2016 Essential Skills with The Smart Method is available as both a low-cost printed paper book (always in stock at Amazon) and as a PDF e-Book (provided in the same unlocked, printable format as this e-Book).

You can only obtain the *Essential Skills* e-Book from the https://TheSmartMethod.com web site (this is the publisher's own web site).

Essential skills course outline

Session 1: Basic Skills

- Start Excel and open a new blank workbook
- Check that your Excel version is up to date
- Change the Office Theme
- Maximize, minimize, re-size, move and close the Excel window
- Download the sample files and open/navigate a workbook
- Save a workbook to a local file
- Understand common file formats
- Pin a workbook and understand file organization
- View, move, add, rename, delete and navigate worksheet tabs
- Use the Versions feature to recover an unsaved Draft file
- Use the Versions feature to recover an earlier version of a workbook
- Use the Ribbon
- Understand Ribbon components
- Customize the Quick Access Toolbar and preview the printout
- Use the Mini Toolbar, Key Tips and keyboard shortcuts
- Understand views
- Hide and show the Formula Bar and Ribbon
- Use the Tell Me help system
- Use other help features

Session 2: Doing Useful Work with Excel

- Enter text and numbers into a worksheet
- Create a new workbook and view two workbooks at the same time
- Use AutoSum to quickly calculate totals
- Select a range of cells and understand Smart Tags
- Enter data into a range and copy data across a range
- Select adjacent and non-adjacent rows and columns
- Select non-contiguous cell ranges and view summary information
- AutoSelect a range of cells
- Re-size rows and columns
- Use AutoSum to sum a non-contiguous range
- Use AutoSum to quickly calculate averages
- Create your own formulas

- Create functions using Formula AutoComplete

- Use AutoFill for text and numeric series

- Use AutoFill to adjust formulas

- Use AutoFill Options

- Speed up your AutoFills and create a custom fill series

- Understand linear and exponential series

- Use Flash Fill to split and concatenate text

- Use the zoom control

- Print out a worksheet

Session 3: Taking Your Skills to the Next Level

- Insert and delete rows and columns

- Use AutoComplete and fill data from adjacent cells

- Cut, copy and paste

- Cut, copy and paste using drag and drop

- Use Paste Values

- Increase/decrease decimal places displayed

- Transpose a range

- Use the multiple item clipboard

- Use Undo and Redo

- Insert, View and Print cell comments

- Understand absolute, relative and mixed cell references

- Understand templates and set the default custom template folder

- Create a template

- Use a template

- Add an Office Add-In to a workbook

- Freeze columns and rows

- Split the window into multiple panes

- Check spelling

Session 4: Making Your Worksheets Look Professional

- Format dates

- Understand date serial numbers

- Format numbers using built-in number formats

- Create custom number formats

- Horizontally and Vertically align the contents of cells

- Merge cells, wrap text and expand/collapse the formula bar
- Understand themes
- Use cell styles and change themes
- Add color and gradient effects to cells
- Add borders and lines
- Create your own custom theme
- Create your own custom cell styles
- Use a master style book to merge styles
- Use simple conditional formatting
- Manage multiple conditional formats using the Rules Manager
- Bring data alive with visualizations
- Create a formula driven conditional format
- Insert a Sparkline into a range of cells
- Apply a common vertical axis and formatting to a Sparkline group
- Apply a date axis to a Sparkline group and format a single Sparkline
- Use the Format Painter
- Rotate text

Session 5: Charts and Graphics

- Understand chart types, layouts and styles
- Create a simple chart with two clicks
- Move, re-size, copy and delete a chart
- Create a chart using the Recommended Charts feature
- Add and remove chart elements using Quick Layout
- Apply a pre-defined chart style and color set
- Manually format a chart element
- Format 3-D elements and add drop shadows
- Move, re-size, add, position and delete chart elements
- Apply a chart filter
- Change a chart's source data
- Assign non-contiguous source data to a chart
- Understand data series and categories
- Change source data using the Select Data Source dialog tools
- Chart non-contiguous source data by hiding rows and columns
- Create a chart with numerical axes
- Deal with empty data points
- Add data labels to a chart

- Highlight specific data points with color and annotations
- Add gridlines and scale axes
- Emphasize data by manipulating pie charts
- Create a chart with two vertical axes
- Create a combination chart containing different chart types
- Work with trend lines and forecast sheets
- Add a gradient fill to a chart background
- Create your own chart templates
- Create a filled map chart

Session 6: Working with Multiple Worksheets and Workbooks

- View the same workbook in different windows
- View two windows side by side and perform synchronous scrolling
- Duplicate worksheets within a workbook
- Move and copy worksheets from one workbook to another
- Hide and unhide a worksheet
- Create cross worksheet formulas
- Understand worksheet groups
- Use find and replace

Session 7: Printing Your Work

- Print Preview and change paper orientation
- Use Page Layout view to adjust margins
- Use Page Setup to set margins more precisely and center the worksheet
- Set paper size and scale
- Insert, delete and preview page breaks
- Adjust page breaks using Page Break Preview
- Add auto-headers and auto-footers and set the starting page number
- Add custom headers and footers
- Specify different headers and footers for the first, odd and even pages
- Print only part of a worksheet
- Add row and column data labels and grid lines to printed output
- Print several selected worksheets and change the page order
- Suppress error messages in printouts

Session 8: Cloud Computing

- Understand Cloud Computing

- Save a workbook to a OneDrive

- Open a workbook from a OneDrive

- Understand operating systems and devices

- Understand Office versions

- Understand Excel Online

- Open a workbook using Excel Online

- Share a link to a workbook

- Edit a workbook simultaneously with other users using Excel Online

B

Appendix B: Skills Covered in the follow-on Expert Skills Course

Every Excel user can benefit from the *Essential Skills* book. After completing this course, students have an Excel skill level that would impress any employer. Your Excel skills will be better than most office workers (even those with many years of Excel experience).

Not many Excel users will need to go further than *Essential Skills* in expanding their skill set. Some users may have special requirements, or simply a desire to understand **absolutely every** Excel feature. For such users, we created our *Expert Skills* book that builds upon the skills learned in the *Essential Skills* book.
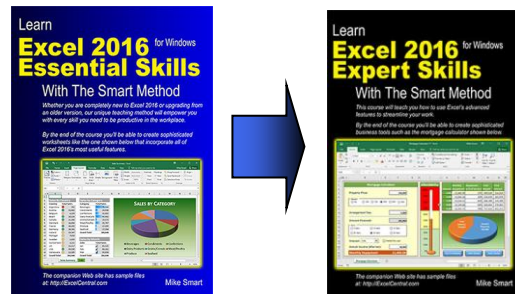
The *Expert Skills* book teaches advanced Excel skills that are rarely mastered by Excel users.

By the end of the book you'll be a true Excel expert. Your Excel skills will be greater and broader than almost all other Excel users in the workplace.

This appendix lists the lessons contained in the eleven sessions that make up the *Expert Skills* book.

Learn Excel 2016 Expert Skills with The Smart Method is available as both a low-cost printed paper book (always in stock at Amazon) and as a PDF e-Book (provided in the same unlocked, printable format as this e-Book).

You can only obtain the *Expert Skills* e-Book from the https://TheSmartMethod.com web site (this is the publisher's own web site: The Smart Method Ltd).

Expert skills course outline

Session 1: Tables, and Ranges

■Understand update channels

■Check that automatic updates are enabled

■Change the Office Theme

■Apply a simple filter to a range

■Apply a top 10 and custom filter to a range

■Apply an advanced filter with multiple OR criteria

■Apply an advanced filter with complex criteria

■Apply an advanced filter with function-driven criteria

■Extract unique records using an advanced filter

■Add totals using Quick Analysis

■Add percentage and running totals using Quick Analysis

■Convert a range into a table and add a total row

■Format a table using table styles and convert a table into a range

■Create a custom table style

■Sort a range or table by rows

■Sort a range by columns

■Sort a range or table by custom list

■Name a table and create an automatic structured table reference

■Create a manual structured table reference

■Use special items in structured table references

■Understand unqualified structured table references

Session 2: Data Integrity, Subtotals and Validations

■   Split fixed width data using Text to Columns

■   Split delimited data using Text to Columns

■   Automatically subtotal a range

■   Create nested subtotals

■   Consolidate data from multiple data ranges

■   Use data consolidation to generate quick subtotals from tables

■   Validate numerical data

■   Create user-friendly messages for validation errors

■   Create data validation input messages

■   Add a formula-driven date validation and a text length validation

- Add a table-based dynamic list validation

- Use a formula-driven custom validation to enforce complex business rules

- Remove duplicate values from a table

- Use a custom validation to add a unique constraint to a column

Session 3: Advanced Functions

- Understand precedence rules and use the Evaluate feature

- Use common functions with Formula AutoComplete

- Use the Insert Function dialog and the PMT function

- Use the PV and FV functions to value investments

- Use the IF logic function

- Use the SUMIF and COUNTIF functions to create conditional totals

- Understand date serial numbers

- Understand common date functions

- Use the DATEDIF function

- Use date offsets to manage projects using the scheduling equation

- Use the DATE function to offset days, months and years

- Enter time values and perform basic time calculations

- Perform time calculations that span midnight

- Understand common time functions and convert date serial numbers to decimal values

- Use the TIME function to offset hours, minutes and seconds

- Use the AND and OR functions to construct complex Boolean criteria

- Understand calculation options (manual and automatic)

- Concatenate strings using the concatenation operator (&)

- Use the TEXT function to format numerical values as strings

- Extract text from fixed width strings using the LEFT, RIGHT and MID functions

- Extract text from delimited strings using the FIND and LEN functions

- Use a VLOOKUP function for an exact lookup

- Use an IFERROR function to suppress error messages

- Use a VLOOKUP function for an inexact lookup

Session 4: Using Names and the Formula Auditing Tools

- Automatically create single-cell range names

- Manually create single cell range names and named constants
- Use range names to make formulas more readable
- Automatically create range names in two dimensions
- Use intersection range names and the INDIRECT function
- Create dynamic formula-based range names using the OFFSET function
- Create table based dynamic range names
- Create two linked drop-down lists using range names
- Understand the #NUM!, #DIV/0! and #NAME? error values
- Understand the #VALUE!, #REF! and #NULL! error values
- Understand background error checking and error checking rules
- Manually check a worksheet for errors
- Audit a formula by tracing precedents
- Audit a formula by tracing dependents
- Use the Watch Window to monitor cell values
- Use Speak Cells to eliminate data entry errors

Session 5: What If Analysis and Security

- Create a single-input data table
- Create a two-input data table
- Define scenarios
- Create a scenario summary report
- Use Goal Seek
- Use Solver
- Hide and unhide worksheets, columns and rows
- Create custom views
- Prevent unauthorized users from opening or modifying workbooks
- Control the changes users can make to workbooks
- Restrict the cells users are allowed to change
- Allow different levels of access to a worksheet with multiple passwords
- Create a digital certificate
- Add an invisible digital signature to a workbook
- Add a visible digital signature to a workbook

Session 6: Working with Hyperlinks, Other Applications and Workgroups

- Hyperlink to worksheets and ranges

- Hyperlink to other workbooks and the Internet
- Hyperlink to an e-mail address and enhance the browsing experience
- Embed an Excel worksheet object into a Word document
- Embed an Excel chart object into a Word document
- Link an Excel worksheet to a Word document
- Understand the three different ways to share a workbook
- Share a workbook using the lock method
- Share a workbook using the merge method
- Share a workbook on a network
- Accept and reject changes to shared workbooks

Session 7: Forms and Macros

- Add group box and option button controls to a worksheet form
- Add a combo box control to a worksheet form
- Set form control cell links
- Connect result cells to a form
- Add a check box control to a worksheet form
- Use check box data in result cells
- Add a temperature gauge chart to a form
- Add a single input data table to a form
- Improve form appearance and usability
- Understand macros and VBA
- Record a macro with absolute references
- Understand macro security
- Implement macro security
- Understand trusted documents
- Record a macro with relative references
- Use shapes to run macros
- Run a macro from a button control
- Show and hide ribbon tabs
- Add custom groups to standard ribbon tabs
- Create a custom ribbon tab

Session 8: Pivot Tables

- Create a one-dimensional pivot table report from a table
- Create a grouped pivot table report

- Understand pivot table rows and columns
- Understand the pivot table data cache
- Apply a simple filter and sort to a pivot table
- Use report filter fields
- Filter a pivot table visually using slicers
- Add a timeline control to a pivot table
- Use slicers to create a custom timeline
- Use report filter fields to automatically create multiple pages
- Format a pivot table using PivotTable styles
- Create a custom pivot table style
- Understand pivot table report layouts
- Add/remove subtotals and apply cell styles to pivot table fields
- Display multiple summations within a single pivot table
- Add a calculated field to a pivot table
- Add a calculated item to a pivot table
- Group by text, date and numeric value ranges
- Show row data by percentage of total rather than value
- Use pivot table values in simple formulas
- Use the GETPIVOTDATA function
- Create a pivot chart from a pivot table
- Embed multiple pivot tables onto a worksheet
- Use slicers to filter multiple pivot tables

Sessions 9-11 cover OLAP technology

Microsoft introduced some extremely sophisticated OLAP (On Line Analytical Processing) tools into Excel 2013. This was further expanded in Excel 2016. OLAP skills are not commonly found in Excel users (even IT professionals often struggle with data modeling and OLAP concepts).

Recognizing that OLAP skills will not be needed by many users (even Excel experts) we placed the OLAP related skills into the last three sessions of the *Expert skills* book.

These sessions cover not only the new OLAP related features, but also the relational modeling theory needed to understand and use them. Full coverage is given to the new OLAP pivot table (a new type of pivot table that can be used with an OLAP data source).

OLAP is the key to working with *Big Data* (in an Excel context, *Big Data* is data that has more than a million rows). In the OLAP sessions you'll sometimes work with very large data sets that contain well over a million rows (exceeding the capacity of an Excel worksheet).

Session 9: Data Modeling, OLAP and Business Intelligence

■ Import tables from an external relational database

■ Understand primary and foreign keys

■ Link primary and foreign keys using VLOOKUP

■ Efficiently import data using a view

■ Understand linked tables

■ Work with big data

■ Create a simple data model

■ Understand OLAP pivot tables

■ Understand OLAP cubes and Business Intelligence

■ Create an OLAP pivot table directly from a relational database

■ Understand many-to-many relationships

■ Create an OLAP pivot table using a many-to-many relationship

■ Understand MDX queries and OLAP pivot table limitations

■ Use the CUBEVALUE function to query an OLAP cube

■ Convert CUBEVALUE functions to include MDX expressions

■ Create an asymmetric OLAP pivot table using Named Sets

Session 10: 3D Maps

■ Create a simple 3D Map

■ Confirm the accuracy of geocoding

■ Map using different location fields

■ Apply filters to a 3D Map

■ Set layer options and customize data cards

■ Add a height field to a layer

■ Apply different visualization types

■ Visualize multiple categories

■ Create a visualization with multiple layers

■ Add annotations

■ Create a video from temporal data

■ Set scene options

■ Create a tour with multiple scenes

Session 11: Create Get & Transform queries

■ Understand Get & Transform and ETL

■ Create a simple extract and load web query

- Understand queries and connections
- Move, remove, rename, filter and sort columns
- Split delimited data
- Specify data types
- Understand steps and PQFL
- Remove empty, error and top and bottom rows
- Understand and work with null values
- Transform date and time columns
- Transform number columns
- Add a custom calculated column
- Create an aggregated data query
- Unpivot aggregated data
- Work with multiple queries
- Create an append query
- Understand normal and de-normalized data
- Create a simple two-table merged query
- Create a five-table merged query

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