

# **Excel 2019 Formulas, Functions, Charts and Graphics**

---

Greg Harvey, PhD

# Table of Contents

---

|   |           |
|---|-----------|
| <b>Introduction</b> .....                                     | <b>1</b>  |
| About This Book .....   | 1         |
| Foolish Assumptions .....                                     | 2         |
| How This Book Is Organized .....                              | 2         |
| Conventions Used in This Book.....                            | 3         |
| <br>  |           |
| <b>Chapter 1 – Building Basic Formulas</b> .....              | <b>5</b>  |
| Learning Objectives .....                                     | 5         |
| Introduction.....   | 5         |
| Formulas 101 .....  | 5         |
| Formula building methods.....                                 | 6         |
| Editing formulas.....   | 6         |
| When you AutoSum numbers in a spreadsheet .....               | 7         |
| Totals and sums with the Quick Analysis tool.....             | 8         |
| Building formulas with computational operators .....          | 9         |
| Using the Insert Function button .....                        | 12        |
| Copying Formulas .....  | 14        |
| Absolute references .....                                     | 17        |
| A mixed bag of references .....                               | 19        |
| Adding Array Formulas.....                                    | 19        |
| Building an array formula .....                               | 20        |
| Editing an array formula .....                                | 22        |
| Range Names in Formulas .....                                 | 23        |
| Defining range names.....                                     | 23        |
| Naming constants and formulas.....                            | 25        |
| Using names in building formulas .....                        | 25        |
| Creating names from column and row headings .....             | 26        |
| Managing range names .....                                    | 27        |
| Applying names to existing formulas.....                      | 28        |
| Adding Linking Formulas .....                                 | 30        |
| Controlling Formula Recalculation .....                       | 31        |
| Circular References.....                                      | 32        |
| Review Questions.....   | 34        |
| Review Answers.....   | 36        |
| <br>  |           |
| <b>Chapter 2 – Logical Functions and Error Trapping</b> ..... | <b>39</b> |
| Learning Objectives.....                                      | 39        |
| Introduction.....   | 39        |
| Understanding Error Values.....                               | 39        |
| Using Logical Functions.....                                  | 40        |
| Evaluating the many talents of the IFS function .....         | 42        |
| SWITCH it out.....  | 43        |
| Error-Trapping Formulas .....                                 | 44        |
| Whiting-Out Errors with Conditional Formatting .....          | 46        |
| Formula Auditing .....  | 47        |
| Tracing precedents .....                                      | 48        |
| Tracing dependents .....                                      | 51        |
| Error checking.....   | 52        |
| Changing the Error Checking options.....                      | 53        |

## Table of Contents

|  |           |
|--|-----------|
| Error tracing .....                                    | 54        |
| Evaluating a formula .....                             | 56        |
| Removing Errors from the Printout.....                 | 57        |
| Review Questions.....                                  | 58        |
| Review Answers .....                                   | 60        |
| <b>Chapter 3 – Date and Time Formulas .....</b>        | <b>63</b> |
| Learning Objectives.....                               | 63        |
| Introduction.....                                      | 63        |
| Understanding Dates and Times .....                    | 63        |
| Changing the Regional date settings.....               | 63        |
| Building formulas that calculate elapsed dates.....    | 64        |
| Building formulas that calculate elapsed times.....    | 64        |
| Using Date Functions .....                             | 65        |
| TODAY .....  | 65        |
| DATE and DATEVALUE .....                               | 66        |
| DAY, WEEKDAY, MONTH, and YEAR .....                    | 67        |
| DAYS360.....   | 68        |
| Other special Date functions .....                     | 68        |
| Using Time Functions.....                              | 71        |
| NOW.....   | 72        |
| TIME and TIMEVALUE .....                               | 72        |
| HOUR, MINUTE, and SECOND.....                          | 73        |
| Review Questions.....                                  | 74        |
| Review Answers .....                                   | 75        |
| <b>Chapter 4 – Financial Formulas .....</b>            | <b>77</b> |
| Learning Objectives.....                               | 77        |
| Introduction.....                                      | 77        |
| Financial Functions 101.....                           | 77        |
| The PV, NPV, and FV Functions .....                    | 78        |
| Calculating the Present Value.....                     | 78        |
| Calculating the Net Present Value .....                | 79        |
| Calculating the Future Value.....                      | 80        |
| The PMT Function.....                                  | 80        |
| Depreciation Functions.....                            | 83        |
| Analysis ToolPak Financial Functions.....              | 85        |
| Review Questions.....                                  | 88        |
| Review Answers .....                                   | 90        |
| <b>Chapter 5 – Math and Statistical Formulas .....</b> | <b>93</b> |
| Learning Objectives.....                               | 93        |
| Introduction.....                                      | 93        |
| Math & Trig Functions.....                             | 93        |
| Rounding off numbers.....                              | 94        |
| POWER and SQRT .....                                   | 97        |
| The SUM of the parts.....                              | 98        |
| Conditional summing .....                              | 98        |
| Statistical Functions.....                             | 101       |
| AVERAGE, MAX, and MIN .....                            | 101       |
| Counting cells .....                                   | 102       |
| Using specialized statistical functions .....          | 106       |

## Table of Contents

|  |            |
|--|------------|
| Review Questions.....  | 107        |
| Review Answers.....  | 109        |
| <b>Chapter 6 – Lookup, Information, and Text Formulas.....</b> | <b>111</b> |
| Learning Objectives.....                                       | 111        |
| Introduction.....  | 111        |
| Lookup and Reference.....                                      | 111        |
| Looking up a single value with VLOOKUP and HLOOKUP.....        | 111        |
| Performing a two-way lookup.....                               | 114        |
| Reference functions.....                                       | 117        |
| Information, Please.....                                       | 119        |
| Getting specific information about a cell.....                 | 119        |
| Are you my type?.....  | 121        |
| Using the IS functions.....                                    | 122        |
| Much Ado about Text.....                                       | 122        |
| Using text functions.....                                      | 122        |
| The T function.....  | 125        |
| TEXTJOIN function.....   | 125        |
| Concatenating text.....  | 126        |
| Review Questions.....  | 128        |
| Review Answers.....  | 129        |
| <b>Chapter 7 – Charting Worksheet Data.....</b>                | <b>131</b> |
| Learning Objectives.....                                       | 131        |
| Introduction.....  | 131        |
| Worksheet Charting 101.....                                    | 131        |
| Embedded charts versus charts on separate chart sheets.....    | 132        |
| Inserting recommended charts.....                              | 133        |
| Inserting specific chart types from the Ribbon.....            | 134        |
| Inserting charts with the Quick Analysis tool.....             | 136        |
| Creating a chart on a separate chart sheet.....                | 136        |
| Refining the chart from the Design tab.....                    | 138        |
| Customizing chart elements from the Format tab.....            | 141        |
| Customizing the elements of a chart.....                       | 144        |
| Formatting elements of a chart.....                            | 147        |
| Saving a customized chart as a template.....                   | 151        |
| Adding Sparkline Graphics to a Worksheet.....                  | 152        |
| Adding Infographics to a Worksheet.....                        | 153        |
| Printing Charts.....   | 156        |
| Review Questions.....  | 157        |
| Review Answers.....  | 158        |
| <b>Chapter 8 – Adding Graphic Objects.....</b>                 | <b>161</b> |
| Learning Objectives.....                                       | 161        |
| Introduction.....  | 161        |
| Graphic Objects 101.....                                       | 161        |
| Manipulating graphics.....                                     | 162        |
| Moving graphic objects to new layers.....                      | 163        |
| Aligning graphic objects.....                                  | 165        |
| Grouping graphic objects.....                                  | 165        |
| Managing graphic objects in the Selection task pane.....       | 167        |
| Inserting Different Types of Graphics.....                     | 167        |

## Table of Contents

|  |            |
|--|------------|
| Inserting 2-D online images .....                  | 168        |
| Inserting 3-D online images .....                  | 169        |
| Inserting local pictures .....                     | 169        |
| Editing pictures .....                             | 170        |
| Formatting photos and line art pictures .....      | 170        |
| Formatting 3-D model images .....                  | 172        |
| Drawing Graphics .....                             | 172        |
| Drawing predefined shapes .....                    | 172        |
| Adding text boxes .....                            | 173        |
| Inserting WordArt .....                            | 176        |
| Inserting SmartArt graphics .....                  | 178        |
| Adding Screenshots of the Windows 10 Desktop ..... | 180        |
| Using Themes .....                                 | 181        |
| Review Questions .....                             | 182        |
| Review Answers .....                               | 183        |
| <b>Glossary .....</b>                              | <b>185</b> |
| <b>Index .....</b>                                 | <b>191</b> |