Instructor’s Manual Materials to Accompany

EXPLORING MICROSOFT® OFFICE 2013, VOLUME 1

## EXCEL CHAPTER 7: SPECIALIZED FUNCTIONS

### Available Instructor Resources

|  |  |  |
| --- | --- | --- |
| **Resource** | **File Name** | **Found** |
| **Student Data Files** | various | Online Instructor Resource Center |
| **Solution Files** | various | Online Instructor Resource Center |
| **Answer Keys** |  | Online Instructor Resource Center |
| Matching | e07\_answerkey\_match |
| Multiple Choice | e07\_answerkey\_mc |  |
| Concepts Checks | e07\_answerkey\_concepts |  |
| **Scorecards** | e07b1Tips\_scorecard | Online Instructor Resource Center |
| **Scoring Rubrics** | e07b1Tips\_rubric | Online Instructor Resource Center |
| **Annotated Solution File** | e07b1Tips\_annsolution | Online Instructor Resource Center |
| Scripted Lecture (Script) | e07\_script | Online Instructor Resource Center |
| Scripted Lecture Solution | e07\_script\_solution |
| Scripted Lecture Data | e07\_script\_data |  |
| **PowerPoint Presentation** | e07\_powerpoints | Online Instructor Resource Center |
| **Testbank** | e07\_testbank | Online Instructor Resource Center |
| **Instructor's Manual (lesson plans incl.)** | e07\_instructormanual | Online Instructor Resource Center |
| **Assignment Sheet** | e07\_assignsheet | Online Instructor Resource Center |
| **Prepared Exam (Chapter & App)** |  | Online Instructor Resource Center |
| Prepared Exam-Chap instruction | e07\_exam\_chap\_instruction |
| Prepared Exam-Chap solution | e07\_exam\_chap\_solution |
| Prepared Exam-Chap Data | e07\_exam\_chap\_data |
| Prepared Exam-Chap Annotated Sol. | e07\_exam\_chap\_annsolution |
| Prepared Exam-Chap Scorecard | e07\_exam\_chap\_scorecard |
| Prepared Exam-App instruction | e07\_cumexam\_instruction |  |
| Prepared Exam-App solution | e07\_cumexam\_solution |  |
| Prepared Exam-App Data | e07\_cumexam\_data |  |
| Prepared Exam-App Annotated Sol. | e07\_cumexam\_annsolution |  |
| Prepared Exam-App scorecard | e07\_cumexam\_scorecard |  |
| **File Guide** | e07\_file\_guide | Online Instructor Resource Center |
| **Instructor Resource Card** | e07\_ircard | Online Instructor Resource Center |
| **Objective Map** | e07\_objectivesmap | Online Instructor Resource Center |
| **Online Chapter Review** | e07\_chapt\_checklist | Companion Website for Students |
| **Grader Project** |  |  |
| Grader-instruction | e07\_grader\_instruction | Online Instructor Resource Center |
| Grader-solution | e07\_grader\_solution |
| Grader-data | e07\_grader\_data |
| Grader-annoted. Solution | e07\_grader\_annsolution |  |
| Grader-scorecard | e07\_grader\_scorecard |  |
| **Additional Projects (Practice & Mid Level)** |  | Online Instructor Resource Center |
| Additional Proj-Practice instruction | e07\_p\_addproject\_instruction |
| Additional Proj- Practice solutions | e07\_p\_addproject\_solution |
| Additional Proj-Practice Data | e07\_p\_addproject\_data |
| Additional Proj-Practice Ann Sol. | e07\_p\_addproject\_annsolution |
| Additional Proj-Practice Scorecard | e07\_p\_addproject\_scorecard |
| Additional Proj-Mid Level instruction | e07\_ml\_addproject\_instruction |  |
| Additional Proj-Mid Level solutions | e07\_ml\_addproject\_solution |
| Additional Proj-Mid Level Data | e07\_ml\_addproject\_data |
| Additional Proj-Mid Level Ann Sol. | e07\_ml\_addproject\_annsolution |  |
| Additional Proj-Mid Level Scorecard | e07\_ml\_addproject\_scorecard |  |

### CHAPTER OBJECTIVES

#### When students have finished reading this chapter, they will be able to:

* Create a nested logical function
* Use MATCH and INDEX lookup functions
* Use advanced filtering
* Manipulate data with database functions
* Create a loan amortization table
* Perform other financial calculations

### CHAPTER OVERVIEW

#### The major sections in this chapter are:

1. **Logical and Lookup Functions:** Creating a nested logical function; using MATCH and INDEX lookup functions
2. **Database Filtering and Functions:** Using advanced filtering; manipulating data with database functions
3. **Financial Functions:** Creating a loan amortization table; performing other financial calculations

### CLASS RUNDOWN

1. Have students turn in homework assignments.
2. Talk about chapter using discussion questions listed below.
3. Use PowerPoint presentation to help students understand chapter content.
4. Demonstrate Excel 2013.
5. Run through Scripted Lectures for chapter.
6. Have students complete Capstone Exercise for Excel Chapter 7.
7. Use MyITLab for in-class work or to go over homework.
8. Give students Homework Handout for next class period.

### LEARNING OBJECTIVES

#### At the end of this lesson students should be able to:

* Create a nested IF function
* Nest an AND function inside an IF function
* Create a Lookup field using INDEX and MATCH functions
* Create criteria and output ranges
* Perform an advanced filter
* Insert a DAVERAGE function
* Use DMIN, DMAX, and DCOUNT functions
* Change the filter criteria
* Calculate the present value of the loan
* Enter formulas in the amortization table
* Calculate cumulative interest
* Calculate cumulative principal paid

### KEY TERMS

**AND function –** A logical function that returns TRUE when all arguments are true and FALSE when at least one argument is false.

**Criteria range –** An area separate from the data table that specifies the conditions used to filter the table.

**CUMIPMT –** Calculates cumulative interest for specified payment period.

**CUMPRINC –** A financial function that calculates cumulative principal for specified payment periods.

**Database function –** A function that analyzes data for selected records in a table.

**DAVERAGE function –** A database function that averages values in a database column based on specified conditions.

**DCOUNT function –** A database function that counts the cells that contain a number in a database column based on specified conditions.

**DMAX function –** A database function that identifies the highest value in a database column based on specified conditions.

**DMIN function –** A database function that identifies the lowest value in a database column based on specified conditions.

**DSUM function –** A database function that adds values in a database column based on specified conditions.

**FV function –** A financial function that calculates the future value of an investment given a fixed interest rate, term, and periodic payments.

**INDEX function –** A lookup & reference function that returns a value or reference to a value within a range.

**IPMT function –** A financial function that calculates periodic interest for a fixed-term, fixed-rate loan or investment.

**Loan amortization table –** A schedule showing monthly payments, interest per payment, amount toward paying off the loan, and the remaining balance for each payment.

**MATCH function –** A lookup & reference function that identifies a searched item’s position in a list.

**NOT function –** A logical function that returns TRUE if the argument is false and FALSE if the argument is true.

**NPER function –** A financial function that calculates the number of periods for an investment or loan.

**NPV function –** A financial function that calculates the net present value of an investment with periodic payments and a discount rate.

**OR function –** A logical function that returns TRUE if any argument is true and returns FALSE if all arguments are false.

**PPMT function –** A financial function that calculates the principal payment for a specified payment period given a fixed interest rate, term, and periodic payments.

**PV function –** A financial function that calculates the present value of an investment.

**RATE function –** A financial function that calculates the periodic rate for an investment or loan.

### DISCUSSION QUESTIONS

* What is a function? What is an argument?
* What are the differences between the various types of AVERAGE functions? Why would you use them?
* Why would a consumer want to create a loan amortization table for personal use?
* What is a volatile function? Give some examples, and why you might use them.

### WHEN USING SCRIPTED LECTURE IN CLASS, DEMONSTRATE HOW TO:

* Create a nested IF function
* Nest an AND function inside an IF function
* Create a lookup field using INDEX and MATCH functions
* Create criteria and output ranges
* Perform an advanced filter
* Insert a DAVERAGE function
* Use DMIN, DMAX, and DCOUNT functions
* Change the filter criteria
* Calculate the present value of the loan
* Enter formulas in the amortization table
* Calculate cumulative interest
* Calculate cumulative principal paid

### CONNECTIONS PRACTICAL PROJECTS AND APPLICATIONS

* Create a comparison payment plan between purchasing appliances outright or including them in your home mortgage. Which is the better option for total interest paid? Which option has the lower monthly payment?
* Create a comparison payment plan between a typical 30-year mortgage and a shorter one, such as a 15-year mortgage. What are the differences? Where are the differences most significant?
* Have students create a simple break-even template using financial functions.

### TEACHING NOTES

#### Logical and Lookup Functions

*Logical functions enable testing of conditions to determine is the condition is true or false.*

1. Creating a Nested Logical Function
   * There are a number of new functions in Excel 2013 that did not exist in previous versions. Check Microsoft’s Office online support for a list of the new functions.
   * The calculated results of formulas and some functions in Excel may differ slightly between a Windows PC and a Windows RT PC. This may be more technical than your students need to know, but it is something to keep in mind for students who use multiple machines.
   * Nested functions can be confusing for some users—pointing out that the number of parentheses must match as a troubleshooting tip can help.
   * **Teaching** **Tip**: To determine how many logical tests you need, count the number of outcomes and subtract one. For example, if you have three outcomes (such as Exceeds Expectations, Meets Expectations, and Below Expectations), you need only two logical tests. The first logical test produces one outcome (Exceeds Expectations). The nested logical test produces a second outcome (Meets Expectations) if true or produces the third outcome (Below Expectations) if false. Therefore, you do not need a third logical test to produce the third outcome.
   * **Teaching Tip**: If the logical argument contains text or empty cells, those values are ignored. If no values exist in the logical argument, the AND function returns the #VALUE! error.
2. Using MATCH and INDEX Lookup functions

* **Teaching Tip**: The reference form displays the cell reference of a row and column intersection. The syntax for the reference form is =INDEX(reference,row\_num,[column\_num],[area\_num]). Use Help to learn about the arguments and to see an example of its usage.
  + **Teaching Tip**: Be aware that using mixed or absolute cell references can return incorrect results in nested functions.

Database Filtering and Functions   
  
*While Microsoft Access is more appropriate for relational database modeling, Excel is often used for basic database storage and manipulation.*

1. Using Advanced Filter
   * Remember that you are often creating a database table that others also will need to use. Documentation—such as adding comments—can help you communicate information that you do not want cluttering up the worksheet itself.
   * Students sometimes confuse Excel with a database, at least verbally—which it only resembles if you think of it as a flat file database. Just because it has multiple worksheets it does not mean that it has relational capabilities. If you are going to cover Access in your class, spend some time during your discussion on Excel on the difference between the two—it will help reinforce the concept when you get to Access.
   * Blank cells can cause issues with formulas and functions. Many features treat a blank cell as the end of your data (such as AutoSum). Be aware of this to avoid the errors that this can cause.
   * **Teaching** **Tip**: Using equal (=) and unequal (<>) symbols with the criteria values selects records with empty and nonempty fields, respectively. An equal with nothing after it will return all records with no entry in the designated column. An unequal (<>) with nothing after it will select all records with an entry in the column. An empty cell in the criteria range returns every record in the list.
   * **Teaching Tip**: When you use the Advanced Filter dialog box, Excel assigns the range name *Criteria* to the criteria range and *Extract* to the output range.
2. Manipulating Data with Database Functions
   * Inviting feedback on a spreadsheet can really help ensure its doing its job—which is to convey information to the users. Once you have your spreadsheet formatted, ask one or two coworkers (or classmates) to take a look—was it easy to understand what the worksheet was about? Could they clearly see what was most important on the page? Do they have any suggestions?
   * **Teaching** **Tip**: Alternatively, to begin using a database function, you can type =D in a cell. Excel displays the Formula AutoComplete list, showing a list of functions that start with the letter D. Select the appropriate database function from the list.
   * **Teaching Tip**: The DAVERAGE function displays a division-by-zero error message if no records meet the specified criteria. You can hide the error message by nesting the DAVERAGE function inside the IFERROR function, which detects the error: =IFERROR(DAVERAGE(A6:H21,“Salary”,A24:F25),“No Records Match the Criteria”).
   * **Teaching Tip**: Excel contains additional database functions, such as DSTDEV to calculate the sample population standard deviation for values in a database column and DVAR to estimate the sample population variance for values in a database column when specified conditions are met.
   * **Teaching Tip**: If you type the function instead of using the dialog box, make sure you type the double quotation marks (“) around text. Otherwise, Excel will display an error message.

#### Financial Functions

*Knowing what different financial functions can calculate and how to use them can help plan retirement savings, identify best rates to obtain financial goals, and evaluate how future values of investments compare with today’s values.*

1. Creating a Loan Amortization Table
   * Show students how to quickly find cells that formulas reference by selecting the formula cell and then pressing Ctrl+[. Excel will highlight all the referenced cells and move to the first cell reference. Press Enter to move through the highlighted cells.
   * Users can add a substantial number of financial functions using the Analysis ToolPak.
   * **Teaching** **Tip**: Many homebuyers choose a 30-year mortgage to keep the monthly payment low but opt to pay extra toward the principal each month to reduce the length of the mortgage and the total interest paid. This reduction in interest can be substantial. For example, paying an extra $100 a month on a 30-year, $350,000 mortgage with an interest rate of 3.24% APR can save more than $40,000 in interest over the life of the mortgage and pay off the mortgage before its original payoff date.
   * **Teaching** **Tip**: You can use absolute references when creating a loan amortization table, however, the entire formula is easier to read (and is shorter) in the Formula Bar when you use mixed instead of absolute references.
2. Performing Other Financial Calculations
   * Business students may already be somewhat familiar with the terms future and present value – but these may be concepts difficult for non-business students to grasp. Be prepared to spend some time covering these concepts in addition to how to use those functions in Excel.
   * Don’t forget to show users how to get Help by using the Help on This Function link in the lower-left corner of that particular Function Arguments dialog box. Many users overlook this tool.

### ONLINE CHAPTER REVIEW

To find an online chapter review to help your students practice for tests, visit the Companion Website at <http://www.pearsonhighered.com/exploring/>.

### ADDITIONAL WEB RESOURCES

1. What's new in Excel 2013—<http://office.microsoft.com/en-us/excel-help/what-s-new-in-excel-2013-HA102809308.aspx>
2. Online Excel Help—[www.mrexcel.com](http://www.mrexcel.com)
3. Microsoft Tech Support—<http://support.microsoft.com>

### PROJECTS AND EXERCISES

|  |  |  |
| --- | --- | --- |
|  | **Data file** | **Save As** |
| Hands-On Exercise 1 | e07h1Salary.xlsx | e07h1Salary\_LastFirst.xlsx |
| Hands-On Exercise 2 | e07h1Salary\_LastFirst.xlsx | e07h2Salary\_LastFirst.xlsx |
| Hands-On Exercise 3 | e07h2Salary\_LastFirst.xlsx | e07h3Salary\_LastFirst.xlsx |
| Practice Exercise 1 | e07p1Finance.xlsx | e07p1Finance\_LastFirst.xlsx |
| Practice Exercise 2 | e07p2House.xlsx | e07p2House\_LastFirst.xlsx |
| Practice Exercise 3 |  | e07p3Retirement\_LastFirst.xlsx |
| Mid-Level Exercise 1 | e07m1Admissions.xlsx | e07m1Admissions\_LastFirst.xlsx |
| Mid-Level Exercise 2 | e07m2Art.xlsx | e07m2Art\_LastFirst.xlsx |
| Mid-Level Exercise 3 | e07m3Personal.xlsx | e07m3Personal\_LastFirst.xlsx |
| BYC 2 Research | e07b2Renovation.xlsx | e07b2Renovation\_LastFirst.xlsx |
| BYC 3 Disaster Recovery | e07b3Cruises.xlsx | e07b3Cruises\_LastFirst.xlsx |
| BYC 4 Collaboration | e07b4Evaluation.xlsx | e07b4Evaluation\_LastFirst.xlsx |
| Capstone | e07c1Apartment.xlsx | e07c1Apartment\_LastFirst.xlsx |

### CHAPTER REVIEW/ANSWERS TO END OF CHAPTER MATERIAL

**Key Terms Matching Answer Key**

1. The **NPER function (P)** calculates the number of periods for an investment or loan.

2. The **FV function (J)** calculates the future value of an investment.

3. The **NPV function (Q)** calculates the net present value of an investment with periodic payments and a discount rate.

4. The **CUMPRINC function (C)** calculates cumulative principal for specified payment periods.

5. The **PV Function (T)** calculates the present value of an investment.

6. The **CUMIPMT function (B)** calculates cumulative interest for specified payment periods.

7. A **Loan amortization table (M)** is a schedule showing monthly payments, interest per payment, amount toward paying off the loan, and the remaining balance for each payment.

8. The **PPMT function (S)** calculates the principal payment for a specified payment period given a fixed interest rate, term, and periodic payments.

9. The **IPMT function (L)** calculates periodic interest for a fixed-term, fixed-rate loan or investment.

10. The **DCOUNT function (F)** counts the cells that contain a number in a database column based on specified conditions.

11. The **DMAX function (G)** identifies the highest value in a database column based on specified conditions.

12. The **DMIN function (H)** identifies the lowest value in a database column based on specified conditions.

13. The **DAVERAGE function (E)** averages values in a database column based on specified conditions.

14. The **DSUM function (I)** adds values in a database column based on specified conditions.

15. A **Database function (D)** analyzes data for selected records in a table.

16. The **INDEX function (K)** returns a value or reference to a value within a range.

17. The **MATCH function (N)** identifies a searched item’s position in a list.

18. The **NOT function (O)** returns TRUE if the argument is false and FALSE if the argument is true.

19. The **OR function (R)** returns TRUE if any argument is true and returns FALSE if all arguments are false.

20. The **AND function (A)** Returns TRUE when all arguments are true and FALSE when at least one argument is false.

**Multiple Choice Answer Key**

1. A workbook contains a list of university students. You want to identify the total number of students who are seniors and who are majoring in biology. Without modifying the original student dataset, what function can you use to find the answer to your question?  
**(c) DCOUNT**

2. The original mortgage loan was for $300,000 with a 5% APR for 30 years. You want to calculate the interest on the last monthly payment at the end of the 15th year. What value should be referenced for the *per* argument in the IPMT function?  
**(b) 180**

3. A local police office wants to create a rule that if an officer pulls over a person for exceeding the speed limit by at least five miles per hour or if that person has two or more speeding violations on record, the officer will fine the speeder the higher of $200 or $50 for each mile over the speed limit. Otherwise, the fine is $45. The speed limit is entered in cell B5, the person’s speed is entered in cell B10, and the person’s number of previous tickets is entered in cell B11. What function derives the correct answer?  
**(c) =IF(OR(B10-B5>=5,B11>=2),MAX(200,(B10-B5)\*50),45)**

4. How much interest is paid on the first payment of a $15,000 auto loan financed at 3.25% interest paid monthly over 6 years?  
**(b) $40.63**

5. A worksheet contains the times in which runners completed a race, with the times organized from fastest to slowest. You will use the MATCH function to identify what place a runner came in given a time of 4:05 (four minutes and five seconds). Which argument should contain the specific runner’s time?  
**(a) Lookup\_value**

6. What function would you use to calculate the total principal paid on a loan over a specific start and end date?  
**(d) CUMPRINC**

7. Which database function would you use to count a range of cells that have some cells that are blank without excluding the blank cells?  
**(b) DCOUNTA**

8. Which function should you use to calculate the total interest paid for all monthly payments for the second year of a four year automobile loan?  
**(d) CUMIPMT**

9. In the Advanced Filter dialog box, where do you enter the location for placing the output?  
**(a) Copy to**

10. What function would you use to calculate the total number of periods in a loan or investment?  
**(a) NPER**