Excel Tutorial 7

Using Advanced Functions, Conditional Formatting, and Filtering
Objectives

• Evaluate a single condition using the IF function
• Evaluate multiple conditions using the AND function
• Calculate different series of outcomes by nesting IF functions
• Test whether one or more conditions are true with the OR function
• Return values from a table with the VLOOKUP function
• Check for duplicate values using conditional formatting
Objectives

• Check for data entry errors using the IFERROR function
• Summarize data using the COUNTIF, SUMIF, and AVERAGEIF functions
• Review the COUNTIFS, SUMIFS, and AVERAGEIFS functions
• Use advanced filters
• Summarize data using Database functions
Working with Logical Functions

• **IF Function**
  – IF(logical_test, value_if_true, [value_if_false])

• **AND Function**
  – =IF(AND(G2="FT",M2>=1),K2*0.03,0)

• **Structured References**
  – You can replace the specific cell or range address with a **structured reference**, the actual table name or column header
  – =SUM(Employee[Annual Salary])
## Working with Logical Functions

### Figure 7-6: Special item qualifiers for structured references

<table>
<thead>
<tr>
<th>Qualifier</th>
<th>References</th>
<th>Example of Structured Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>#All</td>
<td>The entire table, including column headers, data, and Total row if displayed</td>
<td>=Employee[#All]</td>
</tr>
<tr>
<td>#Data</td>
<td>The data in the table</td>
<td>=Employee[#Data]</td>
</tr>
<tr>
<td>#Headers</td>
<td>The header row in the table</td>
<td>=Employee[#Headers]</td>
</tr>
<tr>
<td>#Totals</td>
<td>The Total row in the table; if the Total row is hidden, then an error is returned</td>
<td>=Employee[#Totals]</td>
</tr>
<tr>
<td>#ThisRow</td>
<td>The current row in the specified column of the table</td>
<td>=Employee[#ThisRow],[Column Header]</td>
</tr>
</tbody>
</table>
Working with Logical Functions

- A **nested IF function** is when one IF function is placed inside another IF function to test an additional condition.

\[ \text{=IF([Pay Grade]=1,2500,IF([Pay Grade]=2,5000,IF([Pay Grade]=3, 7500,"Invalid pay grade")))} \]
Working with Logical Functions

• The **OR function** is a logical function that returns a TRUE value if any of the logical conditions are true and a FALSE value if all the logical conditions are false.

• \( =\text{IF}(\text{OR}([\text{Years Service}]<1,[\text{Annual Salary}]>100000),0, \text{IF}(\text{[Pay Grade]}=1,$T$1,\text{IF}(\text{[Pay Grade]}=2,$T$2, \text{IF}(\text{[Pay Grade]}=3,$T$3,"Invalid pay grade")))) \)
Using Lookup Tables and Functions

• A **lookup table** is a table that organizes data you want to retrieve into different categories.

• The categories for the lookup table, called **compare values**, are located in the table’s first column or row.

• To retrieve a particular value from the table, a **lookup value** (the value you are trying to find) needs to match the compare values.

• `VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])`
Using Lookup Tables and Functions

**Figure 7-14**

- **Function Arguments dialog box for the VLOOKUP function**

  - **health plan code for the employee in row 2**
  - **table that contains the data you want to look up**
  - **indicates you want to find an exact match**
  - **the column in the HealthPlanRates lookup table that stores the monthly cost**
  - **cost of the health plan for the employee in row 2 of the Employee table**

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New Perspectives on Microsoft Office Excel 2007
Using Lookup Tables and Functions

Figure 7-17  Recognition award table converted to a lookup table

<table>
<thead>
<tr>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Years of Service</td>
<td>Recognition Award</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0 $</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1 $ 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3 $ 200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5 $ 300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>7 $ 500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Highlighting Duplicate Records with a Custom Format

- Select the column you want to search for duplicates
- In the Styles group on the Home tab, click the Conditional Formatting button, point to Highlight Cells Rules, and then click Duplicate Values
- Click the values with arrow, then click Custom Format
- In the Format Cells dialog box, set the formatting you want to use
- Click the OK button in each dialog box
Highlighting Duplicate Records with a Custom Format

Figure 7-19
Using the Conditional Formatting Rules Manager

• Each time you create a conditional format, you are defining a conditional formatting rule.
• A **rule** specifies the type of condition (such as formatting cells greater than a specified value), the type of formatting when that condition occurs.
Using the IFERROR Function

• **Error values** such as #DIV/0!, #N/A, and #VALUE! indicate that some element in a formula or a cell referenced in a formula is preventing Excel from returning a calculated value.

• The **IFERROR function** can determine if a cell contains an error value and display the message you choose rather than the default error value.

• =IFERROR(VLOOKUP(L2,HealthPlanRates,2,False) *12,"Invalid code")
Using the IFERROR Function

Figure 7-25

Invalid code message in the Health Cost column

completed IFERROR function
descriptive error message
Summarizing Data Conditionally

• You can calculate the number of cells in a range that match criteria you specify using the COUNTIF function, which is sometimes referred to as a conditional count
  
  \[ =\text{COUNTIF}(\text{range},\text{criteria}) \]

• You can add the values in a range that meet criteria you specify using the SUMIF function, which is also called a conditional sum
  
  \[ =\text{SUMIF}(\text{range},\text{criteria},[,\text{sum\_range}]) \]
Summarizing Data Conditionally

- You use the **AVERAGEIF function** to calculate the average of values in a range that meet criteria you specify

  \[ \text{=AVERAGEIF}\left( \text{range}, \text{criteria[,average_range]} \right) \]
Summarizing Data Conditionally

- The **COUNTIFS function** counts the number of cells within a range that meet multiple criteria
  - $$\text{COUNTIFS}(\text{criteria\_range1}, \text{criteria1},[,\text{criteria\_range2}, \text{criteria2}...])$$

- The **SUMIFS function** adds values in a range that meet multiple criteria
  - $$\text{SUMIFS}(\text{sum\_range}, \text{criteria\_range1}, \text{criteria1},[,\text{criteria\_range2}, \text{criteria2}...])$$

- The **AVERAGEIFS function** calculates the average of values within a range of cells that meet multiple conditions
  - $$\text{AVERAGEIFS}(\text{average\_range}, \text{criteria\_range1}, \text{criteria1},[,\text{criteria\_range2}, \text{criteria2}...])$$
Using Advanced Filtering

- Advanced filtering, similar to filtering, displays a subset of the rows in a table or range of data.
- The **criteria range** is an area in a worksheet, separate from the range of data or Excel table, used to specify the criteria for the data to be displayed after the filter is applied to the table.
Using Advanced Filtering

<table>
<thead>
<tr>
<th>Condition</th>
<th>Text Data</th>
<th>Sample Last Name</th>
<th>Numeric Data</th>
<th>Date Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exact match</td>
<td>=&quot;text string&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Begins with</td>
<td>text string</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater than</td>
<td>&gt;text string</td>
<td>&gt;S</td>
<td>&gt;50000</td>
<td>&gt;12/31/2009</td>
</tr>
<tr>
<td>Greater than or equal to</td>
<td>&gt;=text string</td>
<td>&gt;=S</td>
<td>&gt;=50000</td>
<td>&gt;=1/1/2010</td>
</tr>
<tr>
<td>Less than</td>
<td>&lt; text string</td>
<td>&lt;S</td>
<td>&lt;50000</td>
<td>&lt;1/1/2010</td>
</tr>
<tr>
<td>Less than or equal to</td>
<td>&lt;= text string</td>
<td>&lt;=S</td>
<td>&lt;=50000</td>
<td>&lt;=12/31/2009</td>
</tr>
<tr>
<td>Between (beginning and ending points must be in separate cells)</td>
<td>&gt;=beginning text string</td>
<td>&gt;=Sa</td>
<td>&gt;=50000</td>
<td>&gt;=4/1/2010</td>
</tr>
<tr>
<td></td>
<td>&lt;=ending text string</td>
<td>&lt;=Sm</td>
<td>&lt;=60000</td>
<td>&lt;=4/30/2010</td>
</tr>
</tbody>
</table>
Using Advanced Filtering

- Click the **Data** tab on the Ribbon, and then, in the Sort & Filter group, click the **Advanced** button
Using Database Functions to Summarize Data

- Functions that perform summary data analysis (SUM, AVERAGE, COUNT, and so on) on a table of values based on criteria that you set are called the **Database functions**, or **Dfunctions**

- DfunctionName(*table range*, *column to summarize*, *criteria range*)
Using Database Functions to Summarize Data

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAVERAGE</td>
<td>Returns the average of the values that meet specified criteria</td>
</tr>
<tr>
<td>DCOUNT</td>
<td>Returns the number of cells containing numbers that meet specified criteria</td>
</tr>
<tr>
<td>DCOUNTA</td>
<td>Returns the number of nonblank cells that meet specified criteria</td>
</tr>
<tr>
<td>DMAX</td>
<td>Returns the maximum value in search column that meets specified criteria</td>
</tr>
<tr>
<td>DMIN</td>
<td>Returns the minimum value in search column that meets specified criteria</td>
</tr>
<tr>
<td>DSTDEV</td>
<td>Returns the estimate of standard deviation based on a sample of entries that meet the specified criteria</td>
</tr>
<tr>
<td>DSUM</td>
<td>Returns the sum of the values in the summary column that meets specified criteria</td>
</tr>
</tbody>
</table>
Using Database Functions to Summarize Data

Figure 7-38: Health Plan Count report

<table>
<thead>
<tr>
<th>Location Analysis</th>
<th>Count</th>
<th>Total Salary</th>
<th>Average Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austin</td>
<td>57</td>
<td>$3,969,426</td>
<td>$69,639</td>
</tr>
<tr>
<td>Home</td>
<td>7</td>
<td>$236,313</td>
<td>$33,759</td>
</tr>
<tr>
<td>Nashville</td>
<td>21</td>
<td>$587,833</td>
<td>$27,992</td>
</tr>
<tr>
<td>New Orleans</td>
<td>15</td>
<td>$1,570,994</td>
<td>$104,733</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>$6,364,566</td>
<td>$63,646</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Health Plan Count</th>
<th>Salaried</th>
<th>Hourly</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMO</td>
<td>32</td>
<td>13</td>
<td>45</td>
</tr>
<tr>
<td>PPO</td>
<td>15</td>
<td>14</td>
<td>29</td>
</tr>
<tr>
<td>None</td>
<td>18</td>
<td>8</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>35</td>
<td>100</td>
</tr>
</tbody>
</table>

Criteria range to calculate the number of salaried employees with no health plan.