COMMON LOGICAL FUNCTIONS

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND</td>
<td>Returns TRUE if all arguments are met</td>
</tr>
<tr>
<td>FALSE</td>
<td>Returns the logical value FALSE</td>
</tr>
<tr>
<td>IF</td>
<td>Specified a logical test to perform</td>
</tr>
<tr>
<td>IFERROR</td>
<td>Returns a value specified if a formula evaluates to an error, otherwise, returns the result of the formula</td>
</tr>
<tr>
<td>NOT</td>
<td>Reverses the logic of its argument</td>
</tr>
<tr>
<td>OR</td>
<td>Returns TRUE if any argument is True</td>
</tr>
<tr>
<td>TRUE</td>
<td>Returns the logical value of TRUE</td>
</tr>
</tbody>
</table>

THE AND FUNCTION
1. Enter the following data into cells D1 to D3: 78, 110, 45
2. Click on cell E1 - the location where the results will be displayed
3. Click on the Formulas tab|Function Library group|Logical|AND
4. Provide D1<100 in the logical1 area
5. Provide D2<100 in the logical2 area
6. Provide D3<100 in the logical3 area
7. Click OK
8. The value FALSE should appear in cell E1 because the data in cell D2 is greater than 100
9. Modify D2 to read 75 and check the results

THE IF FUNCTION
1. The syntax of this function is: IF(logical_test, [value_if_true], [value_if_false])
2. Create the following:

<table>
<thead>
<tr>
<th>STUDENT</th>
<th>SCORE</th>
<th>RESULT</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student 1</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 2</td>
<td>67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 3</td>
<td>88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 4</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student 5</td>
<td>95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. To determine who passed or failed the test, the formula results read:

   Greater than or equal to 70
   Passed
   Less than 70
   Failed

4. In cell C2, enter the following formula:

   IF(B2>=70, “Passed”, “Failed”)

5. To turn the list of test scores into grades, we will embed an additional IF function as follows:

6. Based on these conditions, the nested formula entered in cell D2, will be:


7. If we use the IF function four times, we need to include four ending parentheses in the formula.

THE TRUE OR FALSE FUNCTION
1. The syntax for the TRUE OR FALSE function is:

   IF(logical_test, [value_if_true], [value_if_false])

IFERROR FUNCTION
1. The Excel Iferror function tests if an initial supplied value (or expression) returns an error, and if so, returns a second supplied argument; Otherwise the function returns the initial tested value.
2. The Iferror function is new to Excel 2007, so is not available in earlier versions of MS Excel
3. The syntax of the function is: IFERROR( value, value_if_error )

COMBINING THE OR WITH THE IF FUNCTION
1. By itself, the OR function has limited usefulness. By combining it with another function, such as the IF function, the OR function can increase the capabilities of your spreadsheet.
2. To Nest an OR function inside an IF function

   =IF(OR(B1>100,B2>100,B3>100),”Over Budget”, ”Acceptable”)

3. Assuming this function is located in cell C1, if any of these three cells (B1, B2, or B3) contains a value greater than 100, the IF function will show the statement Over Budget in cell C1. If all three cells have numbers less than or equal to 100, the IF function shows the statement Acceptable in cell C1.

QUICK REFERENCE GUIDE

EXCEL 2010 – Logical Functions

THE OR FUNCTION

1. Enter the following data into cells D1 to D3: 78, 110, 45
2. Click on cell E1 - the location where the results will be displayed
3. Click on the Formulas tab|Function Library group|Logical|AND
4. Provide D1<100 in the logical1 area
5. Provide D2<100 in the logical2 area
6. Provide D3<100 in the logical3 area
7. Click OK
8. The value FALSE should appear in cell E1 because the data in cell D2 is greater than 100
9. Modify D2 to read 75 and check the results

CHANGING THE IF FUNCTION'S RESULTS
1. To change the result in cell E1, change the number in cell D1. For example, change E1 to 15 and press the Enter key
2. The value 100 should now be present in cell E1 since the value in D1 is now less than 26
3. If you click on cell E1, the complete function = IF (D1<26,100,200) appears in the formula bar
CONDITIONAL FORMATTING

1. Create the following:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
<td></td>
</tr>
<tr>
<td>Mary</td>
<td>78</td>
<td>80</td>
<td>91</td>
<td>86</td>
<td></td>
</tr>
<tr>
<td>John</td>
<td>81</td>
<td>88</td>
<td>92</td>
<td>91</td>
<td></td>
</tr>
<tr>
<td>Bill</td>
<td>69</td>
<td>76</td>
<td>83</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Ann</td>
<td>73</td>
<td>94</td>
<td>94</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>75</td>
<td>85</td>
<td>90</td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

2. Select B2:E6
3. Click the Home tab | Styles group | Conditional Formatting | Highlight Cells Rules | Greater Than.
4. Type 85 in the Greater Than dialog
5. Click OK
6. All entries greater than 85 will display with a red background. If there had been an 85 in the selected range it would not be affected by the rule
7. To remove the formatting, with B2:B6 active, select Home tab | Editing group | Clear | Clear Formats
8. Save the copy of the unformatted data to the desktop

TOP/BOTTOM RULE

1. Select B2:E8 in the above created data sheet
2. In the Home tab | Styles group | Conditional formatting | Top/Bottom Rules | Top 10 items
3. Using the spinner, select 5 from the drop-down list and click OK
4. Follow the above and display the bottom 10 entries and in case of ties, more that the designated cell will be marked

DATA BARS ON TOTAL COLUMN

1. Create the following:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>Score</td>
<td>Score</td>
<td>Score</td>
<td></td>
</tr>
<tr>
<td>Mary</td>
<td>78</td>
<td>80</td>
<td>91</td>
<td>86</td>
</tr>
<tr>
<td>John</td>
<td>81</td>
<td>88</td>
<td>92</td>
<td>91</td>
</tr>
<tr>
<td>Bill</td>
<td>69</td>
<td>76</td>
<td>83</td>
<td>62</td>
</tr>
<tr>
<td>Ann</td>
<td>73</td>
<td>94</td>
<td>94</td>
<td>80</td>
</tr>
<tr>
<td>Average</td>
<td>75</td>
<td>85</td>
<td>90</td>
<td>80</td>
</tr>
</tbody>
</table>

2. With the Average data highlighted (B6:E6), click Home tab | Styles group | Conditional Formatting | Color Scales and a scale background
3. Repeat the above, Home tab | Styles group | Conditional Formatting | Color Scales and to choose your own color values, click on More Rules
4. At Select a Rule Type, highlight Format only cells that contain
5. Type the values 0 and 75 for the two boxes that are blank
6. Click the Format button to choose a fill color and font, if required
7. Click OK to apply rules over the selected columns

APPLYING ICON SETS

1. Using the data from the previous task, we are considering three categories: scores >=90, >=79 and <79 and with a Type of Number on all
2. Select the column(s) on which you want to show icons (B2:E5)
3. Select the Home tab | Styles group | Conditional Formatting | Icon Sets | More Rules
4. At New Formatting Rule | Select a Rule Type | select an appropriate one. The first one is OK for now
5. Under Edit the Rule Description | Format Style | icon sets
6. Under Icon pane, we need a set which contains 3 icons, so we can apply icons with each category, as shown in the screenshot below
7. Click OK to apply rules over the selected columns

NUMBERS WITHIN A NUMBER

1. Using the data from the previous task, click in G2
2. Type the following formula: =ISNUMBER(FIND("9",D2))
3. Depress Enter to find that the response is TRUE

ROWS WITH BLANK cells

1. Using the data from the previous task, delete the contents of D2
2. Click in H2
3. Type the following formula: =D2=""
4. Depress Enter to find that the response is TRUE
5. Modify the formula so is returns FALSE

COUNTING DATA ENTRIES

1. Using the data from the previous task, click in A8
2. Type the formula =COUNT(A2:A5)
3. Depress Enter to return a four

COUNTING VALUE ENTRIES

1. Using the data from the previous task, click in B8
2. Type the formula =COUNTA(B2:B5)
3. Depress Enter to return a four

CREATE A SPARKLINE

1. Using the data from the previous task, select F2:F5
2. Select Insert tab | Sparklines group | Line
3. In the Data box, type the range of the cells that contain the target data (B2:E5)
4. Click OK
5. Try changing the appearance of the graph

SOME INTERESTING SHORTCUTS

- CTRL+1 Displays the Format Cells dialog box.
- CTRL+2 Applies or removes bold formatting.
- CTRL+3 Applies or removes italic formatting.
- CTRL+4 Applies or removes underlining.
- CTRL+5 Applies or removes strikethrough.
- CTRL+6 Alternates between hiding & displaying objects.
- CTRL+8 Displays or hides the outline symbols.
- CTRL+9 Hides the selected rows.
- CTRL+0 Hides the selected columns.

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