Microsoft Excel 2010
Lists and Lookups
Microsoft Excel 2010: Lists and Lookups
1.5 hours

In this advanced math workshop we will work with multipart functions such as IF and VLOOKUP statements. An IF statement is a three part function that allows you to change the result based on a logic statement, you can return one value if the answer is TRUE and another if the answer is FALSE. A VLOOKUP statement is a four part function that allows you to search for a value in a large dataset, and return a different value from that same row. For example, if you a large dataset of Employee Numbers, Names, and Titles, you can have Excel search for the Employee Number through the VLOOKUP function and have it return the Employee’s Name and Title. We will also use Data Validation to create drop-down lists that help with data entry. We’ll use the results of the list in our functions. Experience with building equations in Excel required.

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**Insert or delete a drop-down list**

*From Office Help*

To make data entry easier in Excel, or to limit entries to certain items that you define, you can create a drop-down list of valid entries that is compiled from cells elsewhere in the workbook. When you create a drop-down list for a cell, it displays an arrow in that cell. To enter information in that cell, click the arrow, and then click the entry that you want.

To create a drop-down list from a range of cells, use the **Data Validation** command in the **Data Tools** group on the **Data** tab.

1. To create a list of valid entries for the drop-down list, type the entries in a single column or row without blank cells.
   For example:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sales</td>
</tr>
<tr>
<td>2</td>
<td>Finance</td>
</tr>
<tr>
<td>3</td>
<td>R&amp;D</td>
</tr>
</tbody>
</table>

   **Note:** You may want to sort the data in the order that you want it to appear in the drop-down list.

2. If you want to use another worksheet, type the list on that worksheet, and then define a name for the list.

3. Select the cell where you want the drop-down list.

4. On the **Data** tab, in the **Data Tools** group, click **Data Validation**.

5. In the **Data Validation** dialog box, click the **Settings** tab.

6. In the **Allow** box, click **List**.

7. To specify the location of the list of valid entries, do one of the following:
   - If the list is in the current worksheet, enter a reference to your list in the **Source** box.
   - If the list is on a different worksheet, enter the name that you defined for your list in the **Source** box.

   In both cases, make sure that the reference or name is preceded with an equal sign (=). For example, enter =ValidDepts.

8. Make sure that the **In-cell dropdown** check box is selected.

9. To specify whether the cell can be left blank, select or clear the **Ignore blank** check box.
VLOOKUP Worksheet Function
From Office Help

Description
You can use the VLOOKUP function to search the first column of a range of cells, and then return a value from any cell on the same row of the range. For example, suppose that you have a list of employees contained in the range A2:C10. The employees' ID numbers are stored in the first column of the range, as shown in the following illustration.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee ID</td>
<td>Department</td>
<td>Full Name</td>
</tr>
<tr>
<td>35</td>
<td>Sales</td>
<td>Yossi Banai</td>
</tr>
<tr>
<td>36</td>
<td>Production</td>
<td>Nicole Bousseau</td>
</tr>
<tr>
<td>37</td>
<td>Sales</td>
<td>Aik Chen</td>
</tr>
<tr>
<td>38</td>
<td>Operations</td>
<td>Axel Delgado</td>
</tr>
<tr>
<td>39</td>
<td>Sales</td>
<td>Surcor Fatima</td>
</tr>
<tr>
<td>40</td>
<td>Production</td>
<td>Gerhard Goeschl</td>
</tr>
<tr>
<td>41</td>
<td>Sales</td>
<td>Andreas Hauser</td>
</tr>
<tr>
<td>42</td>
<td>Operations</td>
<td>Nattorn Jayanama</td>
</tr>
<tr>
<td>43</td>
<td>Production</td>
<td>Jim Kim</td>
</tr>
</tbody>
</table>

If you know the employee’s ID number, you can use the VLOOKUP function to return either the department or the name of that employee. To obtain the name of employee number 38, you can use the formula =VLOOKUP(38, A2:C10, 3, FALSE). This formula searches for the value 38 in the first column of the range A2:C10, and then returns the value that is contained in the third column of the range and on the same row as the lookup value (“Axel Delgado”).

The V in VLOOKUP stands for vertical. Use VLOOKUP instead of HLOOKUP when your comparison values are located in a column to the left of the data that you want to find.

Remarks
- When searching text values in the first column of table_array, ensure that the data in the first column of table_array does not contain leading spaces, trailing spaces, inconsistent use of straight (‘ or ”) and curly (‘ or “) quotation marks, or nonprinting characters. In these cases, VLOOKUP might return an incorrect or unexpected value. You may be able to use the CLEAN and/or TRIM function to reformat your data.

- When searching number or date values, ensure that the data in the first column of table_array is not stored as text values. In this case, VLOOKUP might return an incorrect or unexpected value.

- If range_lookup is FALSE and lookup_value is text, you can use the wildcard characters — the question mark (?) and asterisk (*) — in lookup_value. A question mark matches any single character; an asterisk matches any sequence of characters. If you want to find an actual question mark or asterisk, type a tilde (~) preceding the character.

Syntax
VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])
The VLOOKUP function syntax has the following arguments:

- **lookup_value** Required. The value to search in the first column of the table or range. The **lookup_value** argument can be a value or a reference. If the value you supply for the **lookup_value** argument is smaller than the smallest value in the first column of the **table_array** argument, VLOOKUP returns the #N/A error value.

- **table_array** Required. The range of cells that contains the data. You can use a reference to a range (for example, A2:D8), or a range name. The values in the first column of **table_array** are the values searched by **lookup_value**. These values can be text, numbers, or logical values. Uppercase and lowercase texts are equivalent.

- **col_index_num** Required. The column number in the **table_array** argument from which the matching value must be returned. A **col_index_num** argument of 1 returns the value in the first column in **table_array**; a **col_index_num** of 2 returns the value in the second column in **table_array**, and so on.

  - If the **col_index_num** is less than 1, VLOOKUP returns the #VALUE! error value.

  - If the **col_index_num** is greater than the number of columns in **table_array**, VLOOKUP returns the #REF! error value.

- **range_lookup** Optional. A logical value that specifies whether you want VLOOKUP to find an exact match or an approximate match:

  - If **range_lookup** is either TRUE or is omitted, an exact or approximate match is returned. If an exact match is not found, the next largest value that is less than **lookup_value** is returned.

  - If **range_lookup** is either TRUE or is omitted, the values in the first column of **table_array** must be placed in ascending sort order; otherwise, VLOOKUP might not return the correct value.

  - If **range_lookup** is FALSE, the values in the first column of **table_array** do not need to be sorted.

  - If the **range_lookup** argument is FALSE, VLOOKUP will find only an exact match. If there are two or more values in the first column of **table_array** that match the **lookup_value**, the first value found is used. If an exact match is not found, the error value #N/A is returned.

<table>
<thead>
<tr>
<th>Find</th>
<th>VLOOKUP() =VLOOKUP(B11,Items,2,FALSE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item from cell B11</td>
<td>B11</td>
</tr>
<tr>
<td>Range &quot;Items&quot;</td>
<td>Items</td>
</tr>
<tr>
<td>column 2</td>
<td>2</td>
</tr>
<tr>
<td>No, find exact</td>
<td>False</td>
</tr>
</tbody>
</table>
IF Worksheet Function
From Office Help
Specifies a logical test to perform

Syntax
IF(logical_test,value_if_true,value_if_false)

- **Logical_test** is any value or expression that can be evaluated to TRUE or FALSE. For example, A10=100 is a logical expression; if the value in cell A10 is equal to 100, the expression evaluates to TRUE. Otherwise, the expression evaluates to FALSE. This argument can use any comparison calculation operator.

- **Value_if_true** is the value that is returned if logical_test is TRUE. For example, if this argument is the text string "Within budget" and the logical_test argument evaluates to TRUE, then the IF function displays the text "Within budget". If logical_test is TRUE and value_if_true is blank, this argument returns 0 (zero). To display the word TRUE, use the logical value TRUE for this argument. Value_if_true can be another formula.

- **Value_if_false** is the value that is returned if logical_test is FALSE. For example, if this argument is the text string "Over budget" and the logical_test argument evaluates to FALSE, then the IF function displays the text "Over budget". If logical_test is FALSE and value_if_false is omitted, (that is, after value_if_true, there is no comma), then the logical value FALSE is returned. If logical_test is FALSE and value_if_false is blank (that is, after value_if_true, there is a comma followed by the closing parenthesis), then the value 0 (zero) is returned. Value_if_false can be another formula.

Remarks
- Up to seven IF functions can be nested as value_if_true and value_if_false arguments to construct more elaborate tests.

- When the value_if_true and value_if_false arguments are evaluated, IF returns the value returned by those statements.

=IF(A10<=100,"Within budget","Over budget")
=IF(A10=100,SUM(B5:B15),"")
=IF(B2>C2,"Over Budget","OK")
=IF(B3>C3,"Over Budget","OK")

Logic Tree

```
               Logical Test
                /   \        
               T     F       
            /     \     /  \ 
           If True If False
```
**Other Logic Functions**
*From Office Help*

**TRUE**

Returns the logical value TRUE.

Syntax: TRUE( )

Remark: You can enter the value TRUE directly into cells and formulas without using this function.

**FALSE**

Returns the logical value FALSE.

Syntax: FALSE( )

Remark: You can also type the word FALSE directly onto the worksheet or into the formula, and Microsoft Excel interprets it as the logical value FALSE.

**AND**

Returns TRUE if all its arguments are TRUE.

Syntax: AND(logical1, logical2, ...)

Logical1, logical2, ... are 1 to 30 conditions you want to test that can be either TRUE or FALSE. The arguments must evaluate to logical values such as TRUE or FALSE. If the specified range contains no logical values, returns the #VALUE! error value.

| =AND(TRUE, TRUE) | TRUE |
| =AND(TRUE, FALSE) | FALSE |
| =AND(FALSE, FALSE) | FALSE |
| =AND(2+2=4, 2+3=5) | TRUE |

**OR**

Returns TRUE if any argument is TRUE.

Syntax: OR(logical1, logical2, ...)

Logical1, logical2, ... are 1 to 30 conditions you want to test that can be either TRUE or FALSE. The arguments must evaluate to logical values such as TRUE or FALSE. If the specified range contains no logical values, returns the #VALUE! error value.

| =OR(TRUE, TRUE) | TRUE |
| =OR(TRUE, FALSE) | TRUE |
| =OR(FALSE, FALSE) | FALSE |
| =OR(1+1=1, 2+2=5) | FALSE |

**NOT**

Reverses the value of its argument. Syntax: NOT(logical) Logical is a value or expression that can be evaluated to TRUE or FALSE. If logical is FALSE, NOT returns TRUE; if logical is TRUE, NOT returns FALSE.

| =NOT(FALSE) | TRUE |
| =NOT(1+1=2) | FALSE |
**IS functions**
*From Office Help*

**Description**
Each of these functions, referred to collectively as the IS functions, checks the specified value and returns TRUE or FALSE depending on the outcome. For example, the ISBLANK function returns the logical value TRUE if the value argument is a reference to an empty cell; otherwise it returns FALSE.

You can use an IS function to get information about a value before performing a calculation or other action with it. For example, you can use the ISERROR function in conjunction with the IF function to perform a different action if an error occurs:

\[ \text{=IF(ISERROR(A1), "An error occurred.", A1 * 2)} \]

This formula checks to see if an error condition exists in A1. If so, the IF function returns the message "An error occurred." If no error exists, the IF function performs the calculation A1*2.

**Syntax**
The IS function syntax has the following argument:

- **Value** - Required. The value that you want tested. The value argument can be a blank (empty cell), error, logical value, text, number, or reference value, or a name referring to any of these.

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>RETURNS TRUE IF</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISBLANK</td>
<td>Value refers to an empty cell.</td>
</tr>
<tr>
<td>ISERR</td>
<td>Value refers to any error value except #N/A.</td>
</tr>
<tr>
<td>ISERROR</td>
<td>Value refers to any error value ( #N/A, #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?, or #NULL!).</td>
</tr>
<tr>
<td>ISLOGICAL</td>
<td>Value refers to a logical value.</td>
</tr>
<tr>
<td>ISNA</td>
<td>Value refers to the #N/A (value not available) error value.</td>
</tr>
<tr>
<td>ISNONTEXT</td>
<td>Value refers to any item that is not text. (Note that this function returns TRUE if the value refers to a blank cell.)</td>
</tr>
<tr>
<td>ISNUMBER</td>
<td>Value refers to a number.</td>
</tr>
<tr>
<td>ISREF</td>
<td>Value refers to a reference.</td>
</tr>
<tr>
<td>ISTEXT</td>
<td>Value refers to text.</td>
</tr>
</tbody>
</table>

**Remarks**
- The value arguments of the IS functions are not converted. Any numeric values that are enclosed in double quotation marks are treated as text. For example, in most other functions where a number is required, the text value "19" is converted to the number 19. However, in the formula ISNUMBER("19"), "19" is not converted from a text value to a number value, and the ISNUMBER function returns FALSE.

- The IS functions are useful in formulas for testing the outcome of a calculation. When combined with the IF function, these functions provide a method for locating errors in formulas.
**Class Exercise**
You can find the file for this workshop from our Excel Handouts Page:
https://training.health.ufl.edu/excel_handouts.aspx

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**Step 1: Name the list of Names**
- Sheet "Shipping Addresses"
- Select column A
- In the Name box, type **NameList**, press enter

---

**Step 2: Name the Addresses Range**
- Sheet "Shipping Addresses"
- Select columns A:D
- In the Name box, type **Addresses**, press enter

---

**Step 3: Name the List of Items**
- Sheet "Sales Items"
- Select column A
- In the Name box, type **ItemList**, press enter

---

**Step 4: Name the Items Range**
- Sheet "Sales Items"
- Select columns A:B
- In the Name box, type **Items**, press enter
Step 5: Set up Name List
- Sheet "Sales Invoice", Cell C5
- Data Tab, Data Validation
  - Allow: List
  - Source: =NameList (don't forget the = sign)

![Data Validation dialog box]

Step 6: Set up Address Lookups
- Sheet "Sales Invoice"

<table>
<thead>
<tr>
<th>VLOOKUP( )</th>
<th>C6</th>
<th>C7</th>
<th>C8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find</td>
<td>Name from cell C5</td>
<td>C5</td>
<td>C5</td>
</tr>
<tr>
<td>Look in</td>
<td>Range &quot;Addresses&quot;</td>
<td>Addresses</td>
<td>Addresses</td>
</tr>
<tr>
<td>Return</td>
<td>column 2, 3, 4</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Find closest #</td>
<td>No, find exact</td>
<td>False</td>
<td>False</td>
</tr>
</tbody>
</table>

- C6: =VLOOKUP(C5,Addresses,2,FALSE)
- C7: =VLOOKUP(C5,Addresses,3,FALSE)
- C8: =VLOOKUP(C5,Addresses,4,FALSE)
Step 7: Set up Item List
- Sheet "Sales Invoice", Cell B11
- Data Tab, Data Validation
  - Allow: List

- Source: =ItemList (don't forget the =)

  - Copy/Fill formula down through Row 17

Step 8: Set up Price Lookups
- Sheet "Sales Invoice"

<table>
<thead>
<tr>
<th>Find</th>
<th>C11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item from cell B11</td>
<td>B11</td>
</tr>
<tr>
<td>Look in</td>
<td>Range &quot;Items&quot;</td>
</tr>
<tr>
<td>Return</td>
<td>column 2</td>
</tr>
<tr>
<td>Find closest #</td>
<td>No, find exact</td>
</tr>
</tbody>
</table>

- C11: =VLOOKUP(B11,Items,2,FALSE)
Step 9: Change equation to hide #N/A

IF Lookup =#N/A

<table>
<thead>
<tr>
<th>Logical Test</th>
<th>Is the vLookup #N/A?</th>
<th>ISNA(VLOOKUP(B11,Items,2,FALSE))</th>
</tr>
</thead>
<tbody>
<tr>
<td>If True</td>
<td>Leave blank</td>
<td>&quot;&quot;</td>
</tr>
<tr>
<td>If False</td>
<td>Do the vLookup</td>
<td>VLOOKUP(B11,Items,2,FALSE)</td>
</tr>
</tbody>
</table>

- C11: =IF(ISNA(VLOOKUP(B11,Items,2,FALSE)),"",VLOOKUP(B11,Items,2,FALSE))
- Copy/Fill equation down to C17

Step 10: Set Subtotal equation
- Sheet "Sales Invoice"
- E11: =C11*D11

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
<th>Qty</th>
<th>Subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- E11: =IF(C11="","",C11*D11)

Step 11: Change equation to hide
- Change equation to account for blanks

IF Item = ""

<table>
<thead>
<tr>
<th>Logical Test</th>
<th>Is the Item blank?</th>
<th>C11=&quot;&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>If True</td>
<td>Leave blank</td>
<td>&quot;&quot;</td>
</tr>
<tr>
<td>If False</td>
<td>Calculate SubTotal</td>
<td>C11*D11</td>
</tr>
</tbody>
</table>

- E11: =IF(C11="","",C11*D11)