Week 1 - Lab 2: Complex Calculations, If-Then Statements, and Pivot Tables

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CPSC 203 - T16

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Overview

- In Today's Tutorial we will learn the following:
  - Custom calculations using a formula (possibly in several steps)
  - Using nested If… Then statement to define classes
  - Summarizing data in a Pivot table
  - Creating a Lookup table to define classes

Custom Calculations

- Useful if you would like to perform a calculation which is not built-in in Excel.

- Can use the built-in functions as well as arithmetic operations.

- Can combine data from different cells in a single worksheet or across different worksheets.
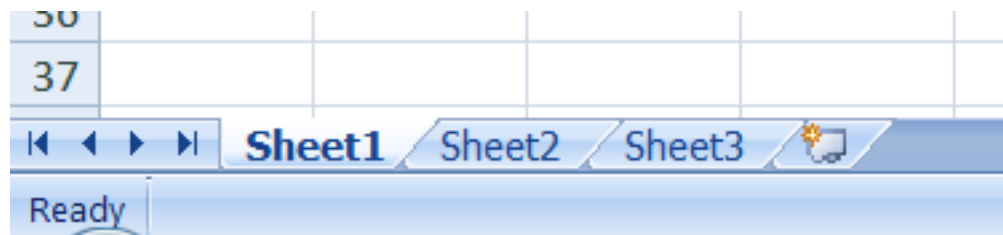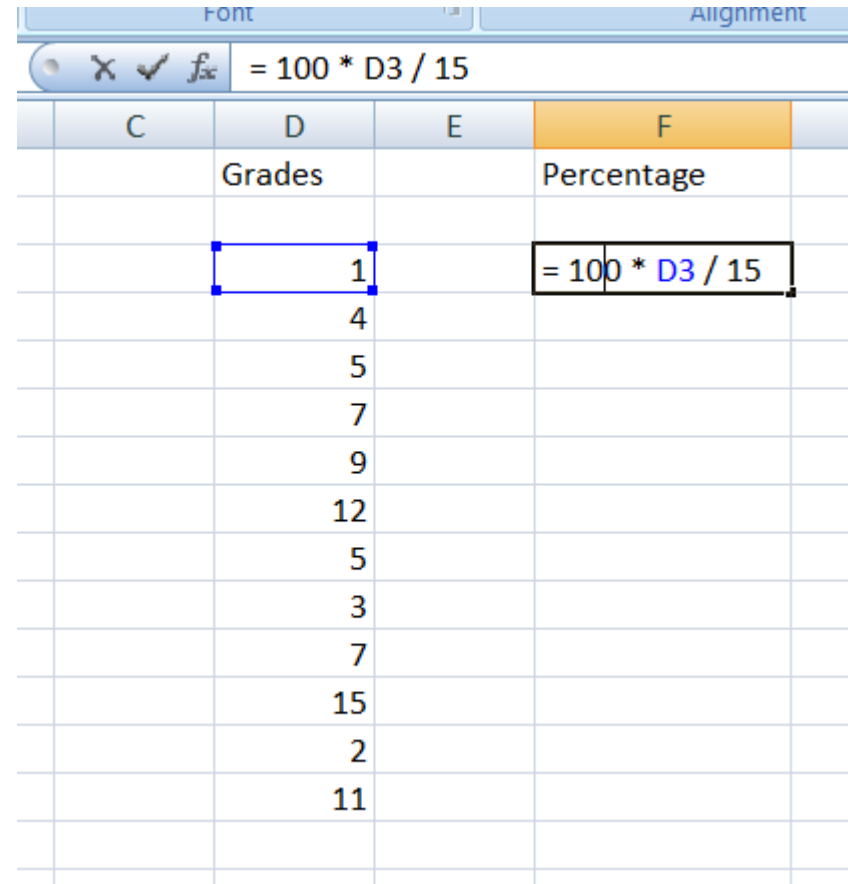
Custom Calculations

- Referencing cells:
  - If the cell is in the same worksheet, use the column and row – A5
  - If the cell is in a different worksheet, use the sheet name, exclamation mark, column and row – Sheet3!D6

- You can change the name of the worksheet, by double clicking on the sheet name.

Custom Calculations

Use the function toolbar to enter the new equation, then press enter.

You can use built-in functions as well as +, -, *, /, and %.

Custom Calculations

- Now, let's use the auto-fill feature with the custom calculation.

fx = 100 * D3 / 15

D	E	F
Grades		Percentage
1		6.67
4		
5		
7		
9		
12		
5		
3		
7		
15		
2		
11		

fx = 100 * D3 / 15

D	E	F
Grades		Percentage
1		6.67
4		26.67
5		33.33
7		46.67
9		60.00
12		80.00
5		33.33
3		20.00
7		46.67
15		100.00
2		13.33
11		73.33

Nested If...Then Statement

- Used to make decisions based on some condition, to define classes.

- If the condition is true, an action is performed, otherwise, another action is performed.

- Consists of 3 parts:
  - Condition/logical test
  - Action to be done if the condition is true
  - Action to be done if the condition is false

Nested If…Then Statement

- The if statement can be written in a cell. The result of the if statement will be stored in the cell.

- Syntax: =IF(<logical statement>, <true statement>, <false statement>)
  - Logical Statement: a condition which can use =, >, >=, <, <=.
  - True/False Statement: a number (ex: 345), or a string of characters inside double quotes (ex: "CPSC 203")

Nested If...Then Statement

- The True/False Statement can contain another If statement – resulting in a Nested If statement
  - Evaluations of inner-most statements occur first, and their evaluations are propagated to the outer-most statements.

```
=IF(G2="Cat","Kitten",IF(G2="Dog","Puppy","Small Mammal"))
```

Nested If...Then Statement

	Simple IfThen		NestedIfThen				
Cat	Kitten		=IF(G2="Cat","Kitten",IF(G2="Dog","Puppy","Small Mammal"))				
Cat	Kitten		K IF(**logical_test**, [value_if_true], [value_if_false])				
Dog	Small Mammal		Puppy				
Cat	Kitten		Kitten				
Hat	Small Mammal		Small Mammal				
Hat	Small Mammal		Small Mammal				
Mouse	Small Mammal		Small Mammal				
Mouse	Small Mammal		Small Mammal				
Toad	Small Mammal		Small Mammal				
Rat	Small Mammal		Small Mammal				
Rat	Small Mammal		Small Mammal				
Cat	Kitten		Kitten				

Pivot Tables

- Used for summarizing data.
- Makes it easier to analyze and present data.

Sum of Expenses	Department			
Month	CPSC	Fine Arts	Haskayne	Grand Total
1	400		200	600
2	220			220
3		5	5000	5005
Grand Total	620	5	5200	5825

Pivot Tables

- http://wiki.ucalgary.ca/page/Courses/Computer_Science/CPSC_203/CPSC_203_Template/Labs_Template/Week_1_-_Lab_2:_Complex_Calculations,_If-Then_Statements,_and_Pivot_Tables

- Example in the link

Pivot Tables

- Steps:
    1. Specify the data source:
        - By selecting the range of cells or table.
        - Make sure that the cells have column headings.

	Month	Department	Expenses
1	Month	Department	Expenses
2	1	CPSC	400
3	1	Haskayne	200
4	2	CPSC	200
5	2	CPSC	20
6	3	Haskayne	5000
7	3	Fine Arts	5
8			

Pivot Tables

- Steps:
    2. Select the 'PivotTable' icon under the 'Tables' contextual menu as part of 'Insert' in the main toolbar.
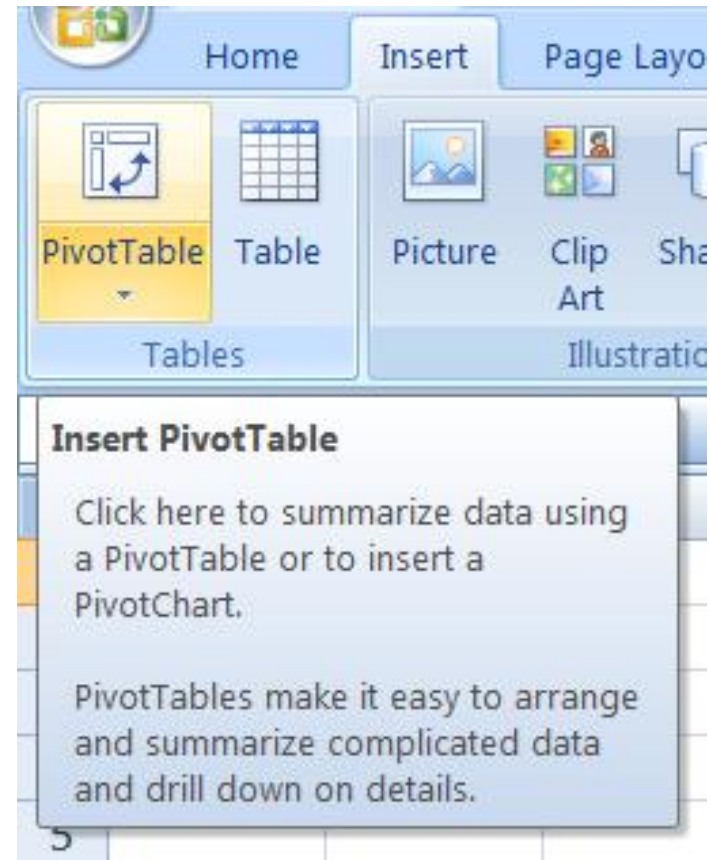
Pivot Tables

- Steps:

  3. In the new panel that appears:

     - Make sure that the selected range of cells or table is correct, and

     - Specify the destination of the Pivot table.

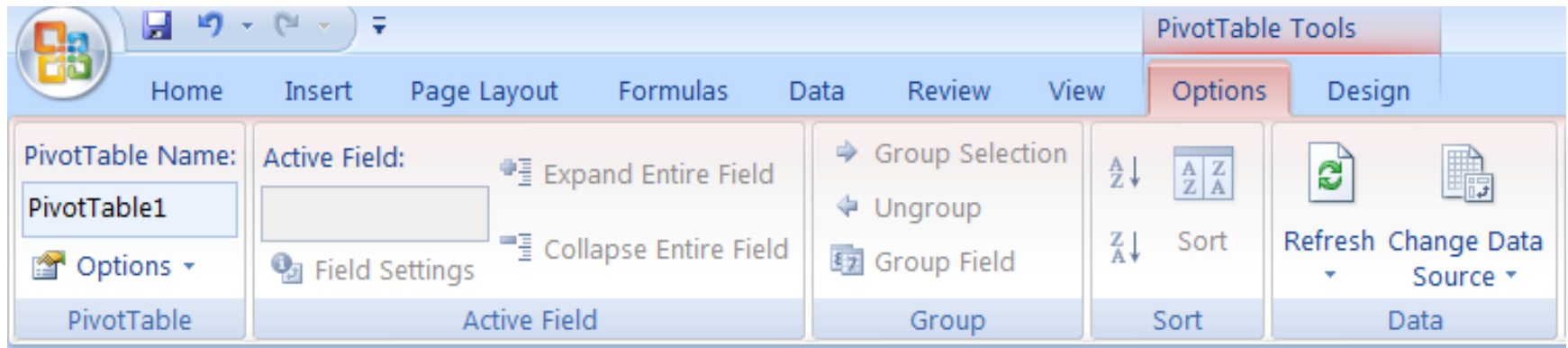   - Press ok and a new Pivot table is created.

Pivot Tables

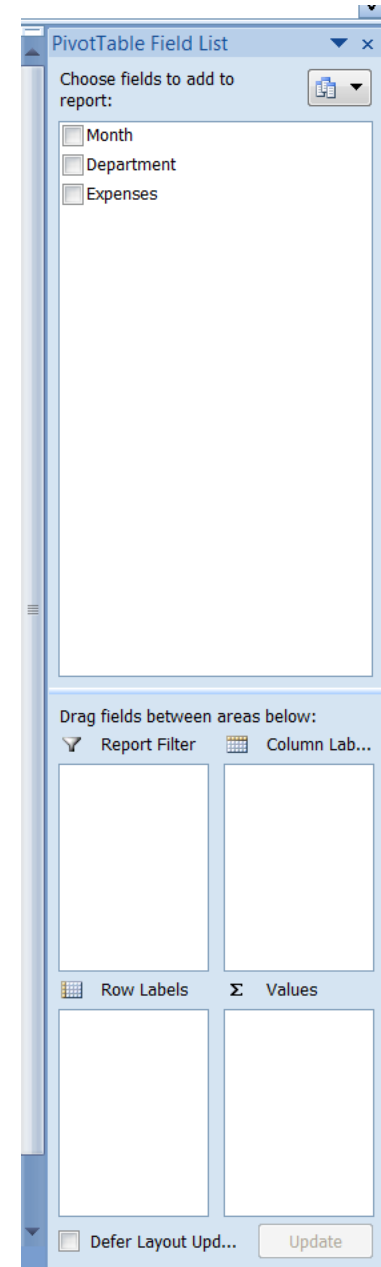# Pivot Tables

- Steps:
    4. Format the Pivot Table:
        - Added to the main toolbar is 'PivotTable Tools' (along with its associated contextual menus), when the Pivot table is selected.

Pivot Tables

- Steps:
  4. Format the Pivot Table:
     - As well, a 'PivotTable Field List' panel also appears when the Pivot table is selected.
     - Choose the fields to be added.
     - Drag and drop the fields in the Report Filter, Row Labels, Column Labels and Values.
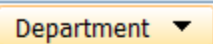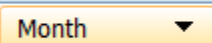
Pivot Tables

Sum of Expenses	Column Labels			
Row Labels	CPSC	Fine Arts	Haskayne	Grand Total
1	400		200	600
2	200		2	202
3	5000	5		5005
Grand Total	**5600**	**5**	**202**	**5807**
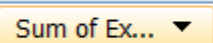
Drag fields between areas below:

Report Filter

Column Lab...
Department ▼

Row Labels
Month ▼

Σ Values
Sum of Ex... ▼

☐ Defer Layout Upd... Update

Lookup Tables

- Lookup functions can be used to find values (data) in a data table, essentially answers to questions.

- We will concentrate on LOOKUP and VLOOKUP functions.

Lookup Function

- Syntax 1:

=Lookup(lookup_value, lookup_vector, [result_vector])

- – lookup_value: the value to search for in the lookup_range
- – lookup_vector: a single row or single column of data that is sorted in ascending order. The Lookup function searches for value in this range.
- – [result_vector]: a single row or single column of data that is the same size as the lookup_range;
- – The Lookup function searches for the value in the lookup_range and returns the value from the same position in the result_range

Lookup Function

- Syntax 2:

=Lookup(lookup_value, array)

- lookup_value: the value to search for in the array (values must be in ascending order)
- Array: an array of values that contains both the values to search for and return

Lookup Function

Lookup Function

	A	B	C	D
1				Lookup Function
2	**Frequency**	**Color**	**Result**	**Function**
3	4.14	red	orange	=LOOKUP(4.19,A3:C7,B3:D7)
4	4.19	orange	orange	=LOOKUP(5,A3:A7,B3:B7)
5	5.17	yellow	blue	=LOOKUP(7.66,A3:A7,B3:B7)
6	5.77	green	#N/A	=LOOKUP(0,A3:A7,B3:B7)
7	6.39	blue		
8				
9				

Lookup Function

- How excel compares the values?
- For equality (=):
  - A match is found, and its corresponding value is returned;
  - The first example where 4.19 is found in column A and the corresponding value in column B is returned, orange

Lookup Function

- How excel compares the values?
- For greater than (>):
  - The next smallest value is found, and its corresponding value is returned;
  - The second example where 5.00 is not found and instead 4.19 is found in column A and the corresponding value in column B is returned, orange

Lookup Function

- How excel compares the values?

- For less than (<):

  - If the value is less than any value, N/A is returned;

  - The fourth example where 0 is less than every number in column A, and as a result, N/A is returned

Vlookup Function

- Looks in the first column of a data table and finds the corresponding value in the row.

- Syntax: =VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])
  - lookup_value corresponds to the value being searched for in the first column
  - table_array corresponds to the range of cells
  - col_index corresponds to the column that represents the data of interest
  - [range_lookup] corresponds to finding an exact match or an approximate match.
  - This is an optional argument, but it is best to use the value FALSE to specify that that the data is not in ascending order.

Relative vs. Absolute Reference

- Relative Cell Reference:
  - Adjusts to its new location when the formula is copied and pasted

Relative vs. Absolute Reference

- Absolute Cell Reference:
  - Does not change, even when the formula is copied and pasted elsewhere.
  - Specified with two dollar signs, where the first dollar sign precedes the column and the second precedes the row (as $C$7).

Relative vs. Absolute Reference

Relative vs. Absolute Reference

When referencing lookup tables, absolute values should be used, or else invalid values will be displayed if the lookup table is smaller than the values to lookup.

Relative vs. Absolute Reference

TRIM	▼	⊘ ✕ ✓ f_x	=LOOKUP(D7,$A$3:$B$7)					

A	B	C	D	E	F	G	H	I
Frequency	**Color**		**Value to Lookup**	**Result**	**Formula used**			
4.14	red		4.19	orange	LOOKUP(D3,$A$3:$B$7)			
4.19	orange		5	orange	LOOKUP(D4,$A$3:$B$7)	**Using absolute**		
5.17	yellow		7.66	blue	LOOKUP(D5,$A$3:$B$7)	**references leads to**		
5.77	green		7.66	blue	LOOKUP(D6,$A$3:$B$7)	**correct results**		
6.39	blue			=LOOKUP(D7,$A$3:$B$7)				
			4.19	orange	LOOKUP(D8,$A$3:$B$7)			
			5.77	green	LOOKUP(D9,$A$3:$B$7)			
			4.14	red	LOOKUP(D10,$A$3:$B$7)			
			5	orange	LOOKUP(D11,$A$3:$B$7)			
			7.66	blue	LOOKUP(D12,$A$3:$B$7)			
			6.39	blue	LOOKUP(D13,$A$3:$B$7)			