MICROSOFT EXCEL 2010

Formulas, Functions, & Macros

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Introduction

This handout was created to familiarize the user with the most common functions in Excel.

Using Formulas

Formulas and function are mathematical statements used to perform calculations.

- A formula is an instruction made up by the user to perform a specific calculation.
- All formulas must start with an equal sign and contain cell addresses, numbers, and mathematical operators.
- When preparing a formula it is important to consider the order of mathematical operations. A formula that has more than one operation follows an order of precedence.

The order is as follows from left to right:

- 1. Exponentiation
- 2. Multiplication
- 3. Division
- 4. Addition
- 5. Subtraction

Note: If a formula has parenthesis, the operation (s) in the parenthesis is performed first. Remember to use the math acronym <u>P</u>lease <u>Excuse</u> <u>My</u> <u>D</u>ear <u>A</u>unt <u>S</u>ally to assist with the order of operations.

Example:

Operator	Meaning	Example	Result (if A1=18 & A2 = 2)
+	Addition	=A1+A2	20
-	Subtraction	=A1-A2	16
*	Multiplication	=A1*A2	36
/	Division	=A1/A2	9
%	Percentage	=A1%A2	.18
^	Exponentiation	=A1^A2	324

Exercise 1

- 1. Create the worksheet listed shown on the next page. The sale tax is approximately is 6% entered as .06.
- 2. Enter the labels and values in the exact cell locations shown in the spreadsheet then format the values as currency.

- 3. Enter the formulas, as shown in the shaded cells. Tap the *Enter* key after each formula.
- 4. Copy the formula to the respective cells by using the fill handle and drag downward.
- 5. Click inside cell <u>C9</u> and then click on the down arrow next to the <u>Auto Sum</u> command ' Σ ' located on the <u>Home</u> tab. Choose the <u>Average</u> function from the list.
- 6. Select the cell range <u>G3:G5</u>.
- 7. Repeat the prior steps for cell <u>C10</u>, but this time use the <u>Sum</u> function.
- 8. Format the cells using the currency format with the dollar sign.

	Α	B	С	D	E	F	G
1	Merchandise		List Price	Discount	Purchase Price	Sales Tax	Total
2							
3	Printer		345	185	=C3-D3	=E3*\$C\$7	=E3+F3
4	Computer		985	265			
5	Monitor		395	98			
6							
7	Sales Tax		.06				
8							
9	Average Cost		=AVG(G3:G5)				
10	Grand Total		=SUM(G3:G5)				

Exercise 2 - Using the PMT Function

- 1. Click on Sheet 2.
- 2. Select the cell range <u>A1:C1</u> and then click the *Merge & Center list arrow* in the Alignment group on the Home tab. Select <u>Merge Cells</u>, and then resize the Font if you wish.
- 3. Select cell range <u>A3:B3</u> and then <u>Merge Across</u>. Drag the <u>Fill handle</u> downward to repeat the merge process. Stop after cell range <u>A8:B8</u>.
- 4. Enter the following column labels starting in cell A1.

<u>Cell:</u>	Type
A1	Payment Calculator
A3	Sticker Price
A4	Interest Rate
A5	Down Payment
A6	Loan Amount
A7	Months
A8	Monthly Payment

- 5. Select cell range A3:A8 and then click the Bold command.
- 6. Hold the Ctrl-key down and select cells C3, C5, C6, and C8. Right-click and choose Format <u>Cells | Currency | Decimal places 2</u> and use the $\frac{1}{2}$ sign. Select the fourth format from the negative numbers box to display the *debit format*.
- 7. Select cell C4. Right click and then choose Percentage | Decimal places (2). Click OK. Select cell C7, then right-click and choose Format Cells | Number (no decimal places or comma).

Function Arguments

PMT

- 8. In cell C6 type =C3-C5. Press Enter.
- 9. Select cell <u>C8</u> and click on the <u>Insert Function button</u> on the Formula Bar. This will open the Function dialog box.
- 10. Under the heading "Select a function:" select the PMT function. Click Ok.
- 11. Left click and hold dow the mouse button on the top part of the dialog bo to move the *Function* Argument box to view the cells in your work area.
- 12. Click inside the
- Argument box "*Rate*"

	Rate	C4/12	.	=	0
	Nper	C7		¥	0
	Pv	-C6		=	0
	Fv			=	number
	Туре		1	=	number
Contraction from the	the environment for	w a lana basad an a	an shareh a suman ha sa	4	and should be been also when

and then click cell C4. Press the forward slash / (division) key and then enter 12. The interest rate is computed annual.

13. Click inside the Argument box *Nper* (number of payments) and then click cell C7 for the number of payments. Click inside the next Argument box Pv. (this stands for the Present value of the loan amount). Type a negative sign (-), then click cell C6. The negative sign before C6 allows us to display a positive number. This play an important role in the next exercise

You have just used the function box to create a spreadsheet that calculates what your payments would be if you were to purchase a vehicle.

- Enter amounts for the sticker price, down payment, and interest rate.
- Change the number of payments and the amount will change.
- Change the interest rate and amount will increase or decrease.

This formula changes with the data entered.

Using the If Statement

- 1. In cell <u>A16</u>, type <u>*Purchase*</u> and then the cell range A16:B16.
- Click the command Merge & Center list arrow located in the Home tab Alignment Group. Select <u>Merge</u> <u>Across</u> and then click the command Bold.
- Click inside cell <u>C16</u> and then the <u>Insert Function</u> button on the formula bar. Select the "<u>IF Function</u>" and then click <u>OK</u>.

Logical_test	C8<=250	TRUE
Value_if_true	"Deal"	= "Deal"
Value_if_false	"No Deal"	🚬 = "No Deal"
cks whether a c SE.	ondition is met, and return	= "Deal" is one value if TRUE, and another value if
cks whether a c SE. Logical_test	ondition is met, and return is any value or expression	= "Deal" is one value if TRUE, and another value if that can be evaluated to TRUE or FALSE.
ecks whether a c .SE. Logical_test mula result =	ondition is met, and return is any value or expression Deal	= "Deal" is one value if TRUE, and another value if that can be evaluated to TRUE or FALSE.

- 4. In the *argument box_"Logical Test"* enter cell reference <u>C8</u> type <=250.
- 5. In the *Value_if_true* box type *Deal* and then press the **Tab key**. In the *Value_if_false* box, type *No Deal*. Click <u>*OK*</u>.

The decision to purchase will be reflected by one or all of the following factors, (1) amount borrowed, (2) interest rate, (3) down payment, or (4) term of loan.

Using Goal Seek

- 1. Click the tab "*Data*," and then the "*What If Analysis*" list arrow in the *Data Tools* group. Select <u>*Goal Seek*</u>.
- <u>Collapse</u> the "Set cell:" dialog box (click with mouse) to select the cell value to change. For this example, choose Monthly Payment cell <u>C8</u>.

Goal Seek	? 🛛
S <u>e</u> t cell:	\$C\$8
To <u>v</u> alue:	
By changing cell:	
ОК	Cancel

- 3. Enter a number (goal) in the box "*To value:*" and then press the tab key.
- 4. Collapse the "By changing cell:" dialog box and then click in cell <u>C5</u>, Down Payment.
- 5. Click <u>OK</u>. Cell C5 now reflects the down payment required to attain the desired goal.
- 6. Click *Cancel* to revert to the prior payment.

Exercise 3

Calculating the Total Interest Paid & Total Cost of the Loan

- 1. Select cell range *A11:B11*. Click the command <u>Merge & Center's list arrow</u> located in the Home tab *Alignment Group*. Select *Merge Across* and then *Bold*. Next, use the *Fill handle* to repeat the merge and formatting to the range below.
- 2. In cells A11 type Total Interest and in A12 type Total Cost.

- 3. Select cells *C11* and *C12*. Right click on the selected cells and choose <u>*Format Cells*</u> | <u>*Currency* | <u>*Decimal*</u> places <u>2</u> and use the <u>\$</u> sign.</u></u>
- 4. In cell <u>A11</u> type=C7*C8-C6. Press the tab key. <u>A12</u> type =C7*C8+C5. Press the tab key and then bold the cell range A11:A12.

Creating a Data Table to Analyze a Worksheet

By creating a data table, you can compare the answers for several different "What if" values.

- 1. Copy and paste cell range *A1*:*C8* in Sheet 3.
- 2. Select and then *Merge & Center* cell range <u>*E1:H1*</u>. Type "*Table Display of Varying Interest Rates*" in the new merged cell.
- 3. Enter the following column labels starting in cell E2 to H2.

<u>Cell</u>	Labels
E2	Interest Rate
F2	Monthly Payment
G2	Total Interest
H2	Total Cost

- 4. Select the cell range *E2:H2*. Click the *Center* button in the *Alignment* group on the *Home* tab. Next, click the *Format list arrow* and choose "<u>AutoFit Column Width.</u>"
- 5. Click in cell <u>*E4*</u> and enter <u>.02</u> as the first number. Then enter <u>.0225</u> in cell *E5*. Select and format both cells as *percentage with two decimal places*.
- 6. Drag the fill handle to cell <u>E14</u> and release. Excel incremented each cell by <u>0.25%</u>.
- Click in cell <u>F3</u>. Type =C8, tab or press the right arrow key. Click in cell <u>G3</u>. Type =C10, tab or press the right arrow key. Click in cell <u>H3</u>. Type =C11, press <u>Enter</u>.
- Select the range E3:H14. Click the What If Analysis list arrow in the Data Tools group on the <u>Data</u> tab. Click the command <u>Data Table</u>, and then click inside the "<u>Column input cell</u>" box. Type either C4 or click on cell C4. Click <u>OK</u>.
- 9. Excel calculates the results of the three formulas in **row 3** for each interest rate in **column D** and immediately fills corresponding values in the data table.
- 10. Select the cell range *F4:H14* and then format the cells as a number with to decimal places. Click the box to Use a 1000 Separator (,).

Note: At your discretion, you may apply borders around the Payment Calculator and the Data Table.

Scenario Summary

- 1. Click the *What If Analysis list arrow* in the *Data Tools* group on the *Data tab* and then the command <u>Scenario Manager</u>.
- Click the <u>Add</u> button and provide a scenario name. Collapse the dialog box "<u>Changing Cells</u>" to select the cells that you would like to change and compare against other data.

To select non-adjacent cells **press** the <u>*Ctrl key*</u> and then click on the respective cells.

3. *For example:* To change the Interest Rate and the Loans Term (Months).

1	Add	
	Delete	
	<u>E</u> dit	
	Merge	
	Summary	
Changing cells:	\$C\$4,\$C\$7	
Comment:	Created by Vincent Yanusauskas on 7/13 Modified by Vincent Yanusauskas on 7/13	/2009 /2009

- ... Hold the Ctrl key down and then click on cells <u>C4</u> and <u>C7</u>. Click <u>OK</u>. The Scenario Values dialog box appears.
- ... Enter the new values in the cells referenced by inputting the new Interest Rate and Loan Term.
- ... Click the <u>Add</u> button to add another scenario and provide another name to compare the results in either a pivot table or summary sheet. Click <u>OK</u> and enter the new values.
- To display the changes in the current spreadsheet *remove the checkmark* from "<u>Prevent Changes</u>." Click <u>OK</u> and then Show to see the changes.

To display the changes summarized in a **new worksheet** select "<u>Summary</u>." When the Scenario Summary dialog box appears, hold down the <u>Ctrl key</u> and select cells <u>C8</u>, <u>C11</u>, and <u>C12</u> and then click <u>OK</u>.

Edit Scenario	? 🔀
Scenario name:	
2]
Changing <u>c</u> ells:	
C4,C7	
Ctrl+click cells to select non-adjacent changing cells. Comment:	
Created by Vincent Yanusauskas on 7/13/2009 Modified by Vincent Yanusauskas on 7/13/2009	~ ~
Protection Prevent changes Hids OK OK	Cancel

The scenario worksheet displays as shown below.

	Current Values:	1	2
Changing Cells:			
\$C\$4	4.00%	4.25%	5.00%
\$C\$7	60	60	60
Result Cells:			
\$C\$8	\$257.83	\$259.41	\$264.20
\$C\$11	\$1,469.88	\$1,564.83	\$1,851.84
\$C\$12	\$21,469.88	\$21,564.83	\$21,851.84

time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.

Exercise 4 - Sorting Custom Lists

- 1. Insert a new spreadsheet and then name it *Custom Lists*. Enter the data below.
- 2. Starting in cell <u>A2</u> enter the current date and then press the <u>Enter key</u>.
- 3. <u>*Click*</u> back on cell A2 and then place the mouse pointer on the *AutoFill handle*.
- <u>Right-click and hold the mouse button down</u> and drag down to cell <u>A10</u>. <u>Release</u> the mouse button to access the AutoFill options menu. Choose <u>Fill Series</u> to populate the cells.

<u>Cell</u>	Entry
A1	Date
B1	Department
C1	Purchase
D1	Cost

5. Populate the remaining cells using the data listed.

Date	Department	Purchase	Cost
6/12/2011	А	Printing	\$44.00
6/13/2011	В	Software	\$124.00
6/14/2011	С	Computers	\$3,200.00
6/15/2011	С	Software	\$500.00
6/16/2011	С	Printing	\$79.00
6/17/2011	А	Hardware	\$300.00
6/18/2011	А	Printing	\$1,200.00
6/19/2011	С	Hardware	\$55.00
6/20/2011	В	Hardware	\$2,400.00
6/21/2011	В	Printing	\$150.00
6/22/2011	A	Software	\$300.00
6/23/2011	В	Printing	\$79.00

- 6. Select the cell range A1:D1 and then click on the tab *File*.
- At the bottom of list, click <u>Options</u>. Choose the option <u>Advanced</u> and then under the label "General," click the button <u>Edit</u> <u>Custom Lists</u>.
 Create lists for use in sorts and fill sequences: <u>Edit Custom Lists</u>...
- 8. In the *Custom Lists dialog box*, verify that the cell reference displayed in the *Import list* from cells box is listed and correct. Click *Import* and then **OK** twice.
- Click in any cell within your data. Click the <u>Sort & Filter</u> list arrow in the *Editing* group on the *Home* tab. Select the command <u>Custom Sort</u> and when the Sort dialog box opens choose Sort by: <u>Department</u> under Column. Select <u>Custom Lists</u> under Order.

Sort					? ×
Add Level	X Delete Level	Copy Level	Deptions.		🔽 My data has beaders
Column		Sort On		Order	
Sort by Depa	rtment 💌	Values		A to Z	*
	son Goldon - Goldon	Contrology -		A to Z Z to A	
				Custom Lis	t

- 10. Select the list *Date*, *Department*, *Purchase* and *Cost* and then click <u>*OK*</u>. Click the **Options** button above and set the *Orientation* to "Sort top to bottom." Click <u>*OK*</u> twice.
- Click the tab <u>Data</u> and then inside one of the list's headers. In the group Outline, select the command <u>Subtotal</u>. Change the following - At each change in: select <u>Department</u>, Use Function: <u>Sum</u> and Add subtotal to: check the box <u>Cost</u>.



Note: you need to check the boxes *Replace current subtotals* and *Summary below data*. Click *OK*.

12. Data should resemble the graphic on the right.

Note: Collapsing the minus buttons on the left side hides the detail displayed such as Dates and Purchases.

-	A	В	С	D
1	Date	Department	Purchase	Cost
2	7/13/2009	A	Printing	\$44.00
3	7/18/2009	A	Computers	\$300.00
4	7/19/2009	A	Printing	\$1,200.00
5	7/23/2009	A	Software	\$300.00
6		A Total		\$1,844.00
7	7/14/2009	В	Software	\$124.00
8	7/21/2009	В	Computers	\$2,400.00
9	7/22/2009	В	Printing	\$150.00
10	7/24/2009	В	Printing	\$79.00
11		B Total		\$2,753.00
12	7/15/2009	C	Computers	\$3,200.00
13	7/16/2009	С	Software	\$500.00
14	7/17/2009	С	Printing	\$79.00
15	7/20/2009	С	Computers	\$55.00
16		C Total		\$3,834.00
17		Grand Total		\$8,431.00
	1 2 3 4 5 6 7 8 9 10 11 11 12 13 14 15 16 17	A 1 Date 2 7/13/2009 3 7/18/2009 4 7/19/2009 5 7/23/2009 6 7 7/14/2009 8 7/21/2009 9 7/22/2009 10 7/24/2009 11 12 7/15/2009 13 7/16/2009 14 7/17/2009 15 7/20/2009 16 17	A B 1 Date Department 2 7/13/2009 A 3 7/18/2009 A 4 7/19/2009 A 5 7/23/2009 A 6 A Total 7 7 7/14/2009 B 8 7/21/2009 B 9 7/22/2009 B 10 7/24/2009 B 11 B Total 12 7/15/2009 C 13 7/16/2009 C 13 7/16/2009 C 14 7/17/2009 C 15 7/20/2009 C 16 C Total C 17 Grand Total C	A B C 1 Date Department Purchase 2 7/13/2009 A Printing 3 7/18/2009 A Computers 4 7/19/2009 A Printing 5 7/23/2009 A Software 6 A Total

Recording a Macro

Macro 1 - Auto formatting a worksheet

You should note that in order to save a macro in Microsoft Excel 2010, the workbook must be saved as an Excel Macro-Enable Workbook. In addition, you will need to add the Developer tab to the Ribbon.

How to:

Click on the tab *File* and then *Excel Options*. Choose the category *Customize Ribbon*, then check the tab "*Developer*".

1. Insert a *New Worksheet* into the Workbook and rename the sheet <u>*Macro1*</u>, then copy and paste the example data from *Sheet 5* into the sheet named <u>*Macro1*</u>.

How to:

Click the *rectangle* between *column A1 and row 1* to select the whole worksheet. Click on the command <u>*Copy*</u> and then paste the data into the sheet Macro1.

- 2. Click on the tab <u>Developer</u> and then the command <u>Record New Macro</u>. You can either assign a name or use the default. Choose <u>This Workbook</u> from the drop down arrow in the dialog box. A description is optional.
- 3. Select the range A1:G1 and then click the <u>Merge & Center list arrow</u> in the <u>Alignment group</u> and select <u>Merge & Center</u> on the Home tab. Change the font to size 14 Bold then repeat only the Merge & Center for cell range A2:G2.
- 4. Select and *Bold* cell range A4:G4.
- 5. Select cell range *C5:G8* and then right click | *Format cells*. Select the tab <u>Number</u> | <u>Category</u> | <u>Number</u>. Check the box *Decimal places* (2) and *Use 1000 Separator* (,).
- 6. Select the range C8:G8. <u>*Right click*</u> | <u>*Format cells*</u> | <u>*Accounting*</u> | (show) \$ *sign*, 2 decimal places.
- 7. Select and *Bold* cell <u>A10</u>.
- 8. Select and <u>Bold</u> cell <u>C10</u> and <u>right-click</u> and choose <u>Format cells</u> <u>|Accounting</u> | show <u>\$</u> sign and 2 decimal places. Click on the Border list arrow in the Font group and add a <u>Double</u> <u>Bottom Border</u>.
- 9. Click the *Stop Macro button* and save the worksheet.
- 10. Select the entire worksheet as we did in the beginning see Step 1. On the <u>Home</u> tab, click the button <u>Clear</u>, <u>then Clear Formats</u>. When the formatting has been removed return to the <u>Developer</u> tab. Click the command button Macros and then run the assigned macro.

Macro 2 - Assign a macro to enter your name and the current date

- Click the tab *Developer* and then the command <u>*Record New Macro*</u>. You can either assign a name or use the default. Choose <u>*This Workbook*</u> from the drop down arrow in the dialog box. A description is optional.
- 2. Right-click cell <u>A20</u> and choose the command <u>Format cells</u>. Select <u>Date</u> as the category and then the Type: "*<u>Wednesday, March 14, 2001</u>" as displayed.
- 3. Next, type =TODAY() in the newly formatted cell. Press <u>Enter</u> and then click the <u>Stop</u> <u>Macro</u> button.
- 4. <u>Save</u> the worksheet. On the tab *Home* click the command button <u>Clear</u>, then <u>Clear Formats</u>. Click in any cell and run the assigned Marco.

Macro 3 - Deleting Blank Rows

- 1. Enter some date in a work sheet leaving blank rows between the data. Use may use the data in Sheet5 or type your own.
- Click the tab *Developer* and then the command <u>*Record New*</u> <u>*Macro*</u>. You can either assign a name or use the default. Choose *This Workbook* from the drop down arrow in the dialog box. A description is optional.
- Click on the tab <u>Home</u>. Click the <u>Find & Select</u> list arrow in the Editing group on the Home Tab. Select the command <u>Go To</u> <u>Special</u> and then select the option <u>Blanks</u>. Click <u>OK</u> to select the blank rows.
- 4. Click the <u>Delete</u> list arrow in the group Cells on the Home tab. Select the commands <u>Delete Cells</u> and then <u>Shift cells up</u> to delete all blank rows.
- 5. <u>*Click*</u> the *Stop Macro button*. Use the *Undo command* to rerun the new created Macro.

Please note that any merged cells are also deleted.

Go To Special	? 🗙		
Select			
○ <u>C</u> omments	C Ro <u>w</u> differences		
C Constants	C Colu <u>m</u> n differences		
C Eormulas	C Precedents		
Mumbers	C Dependents		
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🔽 Logicals	C All levels		
Errors	C La <u>s</u> t cell		
🖲 Blan <u>k</u> s	C Visible cells only		
C Current region	C Conditional formats		
C Current <u>a</u> rray	🔿 Data <u>v</u> alidation		
C Objects	🖲 All		
	C Same		
0	Cancel		

