ITEC1010   Assignment #2 – Excel Spreadsheets

- **Section. N** Due Wednesday, March 25 @11:00 PM. via the upload link.
- **Section. O** Due Thursday, March 26, @11:00 PM via the upload link.

This is a MS Excel assignment. The software is freely available as part of the Office 365 package for students. Download and install to your system if you have not done so already.

Be sure to aim for appropriate formulas and functions that are **flexible**, **elegant** and optimally **comprehensible/meaningful** as discussed in lectures.

> **Problem solutions must make full use of defined name ranges using the labels indicated for each cell/range. Excepting Problem 6: Forecasting, cell addresses should not be used in the formulas.**

RECOMMENDED: Solve each assignment problem below by following the 5-step problem-solving strategies below:

STEP 1: **Understand** the problem clearly -- read the problem instruction carefully more than once.

STEP 2: **Strategize** -- begin by thinking roughly as to how the problem can be solved -- write your ideas out in words.

STEP 3: D**esign** solutions-- write a more structured algorithm or draw a flow chart of the ordered set of steps required to solve the problem.

STEP 4: **Implementation** -- translate your design algorithm to formulae that Excel can execute -- use appropriate functions and name-defined cell ranges for full credit.

STEP 5: **Verification** -- ensure that the results of your formulae match the example values.

MAIN TASK: READ CAREFULLY BEFORE PROCEDING

1. Create an Excel Workbook containing the solutions to the problems below.

2. Save the workbook as your **full name**, e.g., peggy_carter.xlsx (all lowercase). Be sure to save your workbook as a normal Excel workbook file.

3. Each problem must be solved in its own worksheet within one workbook so rename each sheet **tab** with the specific problem **title**, e.g., Mortgage, Invoice, Movies, etc. (Ensure to keep everything compact so that they are easily found and viewable when opened.)

4. You may use the raw data as provided in the examples and supplementary files to test your solutions.

5. Be sure to **include all required components** in appropriate format for each problem solution.

6. Up to 50% penalty will be applied for not using named ranges optimally.

Problem 1: Mortgage

1. Duplicate the Mortgage Calculator model below in your Excel worksheet.
2. Formulae for cells F4 to F7 are as per *Figure 1*.

	A	B	C	D	E	F	G	H	I
1		Mortgage Calculator							
2									
3		Initial Assumptions			Result				
4		Borrowed Amount			Financed Amount	=C4-C5			
5		Deposit			Payment (Month)	=IFERROR(PMT(C7/12, C6*12,-C4--C5),0)			
6		Term (Yrs)			Total Payments	=IFERROR(F5*C6*12,0)			
7		Interest Rate			Total Interest	=IFERROR(F6-F4,0)			

Figure 1

3. Name all appropriate cells using their labels and **reconstruct** the formulae replacing cell address references.
4. Test by entering assumption inputs to cells C4 to C7 using input examples in *Figure 2*.
5. Now reconstruct the summary table (as per *Figure 2* - B10:E11) and populate cells B11 to E11 with appropriate references.
6. Finally format the whole model as per *Figure 2* including:
    a. Model title font set to 14pts and merge-centered (B2:F2);
    b. "Initial Assumptions" and "Result" merge-centered across 2 columns with Thick Outside Borders; other data with All Borders
    c. Summary table labels with Thick Bottom Borders
    d. Format values appropriately as Number, Currency, or Percentage;
    e. Color fill areas with 3 different colors as shown;
    f. Bold face displayed data.

	A	B	C	D	E	F
1				Mortgage Calculator		
2						
3		Initial Assumptions			Result	
4		Borrowed Amount	$ 400,000.00		Financed Amount	$360,000.00
5		Deposit	$ 40,000.00		Payment (Month)	$ 1,286.08
6		Term (Yrs)	30		Total Payments	$462,987.51
7		Interest Rate	1.75%		Total Interest	$102,987.51
8						
9						
10		Interest Rate	Monthly Payment	Total Payments	Total Interest	
11			1.75% $ 1,286.08	$ 462,987.51	$ 102,987.51	
12						

Figure 2

Problem 2: Invoice

Re-create the **Sales Invoice** model below for purchased products with the format and features shown in *Figure 3*. You may use the **Item**, **Quantity** and **List_Price** data as provided.

- **Discount Rate, Discount Threshold** and **HST_Rate** amounts should be specified as shown and referenced in formulae so that any changes in those values will be automatically applied to the Sales Invoice calculations.
- Compute the **Discount** values so that e.g., 3.30% is displayed for items when **Quantity** exceeds the **Discount Threshold** (48) but remain blank otherwise (not zeros).
- **Sale_Price** = the **List_Price** except when discount applies.
- **Total** = the item total price for the quantity ordered;
- **Subtotal** = the total of all line item totals;
- **HST** = the specified rate (13%) of the **Subtotal**
- **Amount_Due** = the sum of **Subtotal** and **HST**

  Hint: Key functions to use: **IF; ISNUMBER;**

Example:

	A	B	C	D	E	F	G
1	Invoice						
2							
3		Sales Invoice					
4		Item	Quantity	List Price /unit	Discount	Sale Price /Unit	Total
5		Printer Ink	36	38.99		38.99	1403.64
6		Paper Pack	50	9.29	3.30%	8.98	449.17
7		File Folders	200	27.99	3.30%	27.07	5413.27
8		USB Sticks	48	12.99	3.30%	12.56	602.94
9							
10							
11						Subtotal	7869.02
12						HST	1022.97
13		Discount Rate	Discount_Threshold	HST_Rate			
14		3.30%	48	13%		Amount Due	8891.99

Figure 3

Problem 3: Movies

Re-create the model below that searches the **Top IMDB Rated Movies** table and returns the attributes of the Rank holding movie.

- Download database file **Top10Movies.csv** and import into your workbook (*Figure 4*).
- The model works by having the user enter the rank # and Excel returns the details stored in the database table. *Figure 5*: Rank # 8 is entered by the user and Excel returns the related Info data.
- Use the rank number input as the lookup value for **VLOOKUP**.
- The solution should be a **single 'master' formula** that would work for any attribute i.e., the formula that returns the correct Title in the searcher Info is appropriate for being Auto-Filled down the column to return the rest of the movie attributes in the Database.

Hint: Key functions to use: **VLOOKUP; MATCH**

Rank	Title	Genre	Director(s)	Rating	Year
1	The Shawshank Rede	Crime, Drama	Frank Darabont	9.3	1994
2	The Godfather	Crime, Drama	Francis Ford Coppola	9.2	1972
3	The Godfather: Part	Crime, Drama	Francis Ford Coppola	9.0	1974
4	The Dark Knight	Action, Crime, Drama	Christopher Nolan	9.0	2008
5	12 Angry Men	Drama	Sidney Lumet	8.9	1957
6	Schindler's List	Biography, Drama, History	Steven Spielberg	8.9	1993
7	The Lord of the Ring:	Adventure, Drama, Fantasy	Peter Jackson	8.9	2003
8	Pulp Fiction	Crime, Drama	Quentin Tarantino	8.9	1994
9	The Good, The Bad a	Western	Sergio Leone	8.8	1966
10	Fight Club	Drama	David Fincher	8.8	1999

Figure 4 - Database: Top10

E	F
Enter Rank # to Search:	8
Info	
Title	Pulp Fiction
Rating	8.9
Year	1994
Genre	Crime, Drama
Director(s)	Quentin Tarantino

Figure 5 - Searcher

Problem 4: Estimates

A company purchases Olive oil according to this price schedule:

- For the first 1000 Litres, $9.20 per Litre
- For any of the next 3000 Litres $8.80 per Litre
- For any oil beyond 4,000 Litres, $8.50 per Litre

The Purchase Estimate spreadsheet calculates the total price of buying x Litres of oil, where x is a number input to a cell (**Ordered**) on the worksheet with values that may fall into any or all of the 3 Tiers of pricing; Total is the total of **Qty**, not simply **Ordered**.

Re-create the model as per below:

1. The model can handle any/all 3 tiers of order scenarios.
2. Format with differentiating colors as per example below.

Hint: Key functions to use: **IF**

Here are 3 possible output examples you can use to test your solutions:

A	B	C	D	E	F
Purchase Estimates:					
				Ordered:	7,900
Purchase Price schedule:		Qty		Price	Total
First 1000 Ltrs.	Tier1:	1,000	@	9.20	9,200
Next 3000 Ltrs.	Tier2:	3,000	@	8.80	26,400
Above 4000 Ltrs.	Tier3:	3,900	@	8.50	33,150
	Total:	7,900		Total Price:	68,750

Figure 6 - Scenario1: Tier 3 Ordered (>4000)

A	B	C	D	E	F
Purchase Estimates:					
				Ordered:	3,500
Purchase Price schedule:		Qty		Price	Total
First 1000 Ltrs.	Tier1:	1,000	@	9.20	9,200
Next 3000 Ltrs.	Tier2:	2,500	@	8.80	22,000
Above 4000 Ltrs.	Tier3:	-	@	8.50	0
	Total:	3,500		Total Price:	31,200

Figure 7 - Scenario2: Tier 2 Ordered (0 -4000)

A	B	C	D	E	F
Purchase Estimates:					
				Ordered:	250
Purchase Price schedule:		Qty		Price	Total
First 1000 Ltrs.	Tier1:	250	@	9.20	2,300
Next 3000 Ltrs.	Tier2:	-	@	8.80	0
Above 4000 Ltrs.	Tier3:	-	@	8.50	0
	Total:	250		Total Price:	2,300

Figure 8 - Scenario: Tier 1 Ordered (0 – 1000)

Problem 5: Commissions

Re-create the model below that identifies the attributes of the **Top Performer of the Month** (the sales Associate with the most accrued sales).

- Download/import the **MonthlySales.csv** and complete the **Monthly_Sales** table (*Figure 9 Left*) used to record each Associate's individual sales for the month as per image below.
    - To do this, re-create the **Commissions Lookup** table (*Figure 9 Right*) defining the commission % for the corresponding **SalePrice** that falls within a range.
- Recreate the **Performance Table** (*Figure 10*) which is the summary of the individual associate's Monthly Sales with formulas for **Properties_Sold; Total_Sales; Commision_Earned**
- Finally, recreate the **Top Performer of the Month** table (*Figure 11*) returning the highest **Total_Sales** from the **Performance Table** (*Figure 10*) identifying the **Associate; Properties_Sold; Commision_Earned**.

Key Functions to use: **LOOKUP; COUNTIF; SUMIF; MAX; INDEX; MATCH;**

Monthly Sales:				Commissions Lookup	
Name	SalePrice	Commission		PriceRanges	Commissions
Qiu	790000	19,750		0	1.0%
Enders	889000	26,670		100,000	2.0%
Irons	923000	27,690		400,000	2.5%
Irons	973000	29,190		800,000	3.0%
Forrest	280000	5,600		1,000,000	3.5%
Karim	1339000	46,865		1,500,000	4.0%
Forrest	485000	12,125		2,000,000	4.5%
Enders	551000	13,775			
Irons	1240000	43,400			
Qiu	991000	29,730			
Enders	1277000	44,695			
Irons	777000	19,425			
Enders	2262000	101,790			
Karim	669000	16,725			
Karim	700000	17,500			
Forrest	1399000	48,965			

Figure 9 - Monthly Sales Table and Commission Lookup Table

Performance Table			
Associate	Properties Sold	Total Sales	Commission Earned
Enders	4	4,979,000	186,930
Forrest	3	2,164,000	66,690
Irons	4	3,913,000	119,705
Karim	3	2,708,000	81,090
Qiu	2	1,781,000	49,480

Figure 10 - Performance Table

TOP Performer of the Month			
Total Sales	Associate	Properties Sold	Commission Earned
4,979,000	Enders	4.0	186,930

Figure 11 - Top Performer of the Month

Problem 6: Forecasting

You have an idea for a new service that offers customized training for subscribers, but you want to get an idea of how your business could grow by capturing portions of the potential market in the next 5 years (60 months).

Construct a forecasting worksheet to calculate:

- the number of new clients each month (period), and
- the total client base (cumulative number of clients signed up) each month (period).

There are the three key parameters values that impact your projections (Figure 12):

1. **Total market potential**
2. **% remaining captured/period**
3. **Market growth/period**

	A	B	C	D
		Forecasting and Charting		
		Total market potential	10,000,000	
		% remaining captured/period	1.1%	
		Market growth/period	0.25%	

Figure 12 - Forecasting Parameters

In your model, make projections for 60 Periods (Months) based on these parameters for the two separate scenarios described below to project the number of new customers (*Figure 13*).

Scenario 1: Constant Market - Total market potential is 10,000,000 customers. Each month you sign up 1.1% of customers in the market that have not yet signed up.

Scenario 2: Growing Market - Total market potential is initially 10,000,000 customers but grows at 0.25% per month. Each month you sign up 1.1% of customers in the market that have not yet signed up.

- Both scenarios initially (*Period* 0) have 0 new customers and 0 total customers.
- Beginning *Period 1*, calculations must consider the previous period's *Total_Clients* values as well as the current period's *New_Clients* values.
- In the case of Scenario 2, the Period 2 *Total_Market* calculations accounts for the **Market growth/period** parameter value.

	A	B	C	D	E	F	G	H	I
25									
26		Scenario 1: Constant Market					Scenario 2: Growing Market		
27	Period	New_Clients	Total_Clients			Period	Total_Market	New_Clients	Total_Clients
28	0	0	0			0	0		0
29	1	107,000	107,000			1	10,000,000	107,000	107,000
30	2	105,855	212,855			2	10,025,000	106,123	213,123
31	3	104,722	317,578			3	10,050,063	105,255	318,378
32	4	103,602	421,179			4	10,075,188	104,398	422,776
33	5	102,493	523,673			5	10,100,376	103,550	526,326
34	6	101,397	625,070			6	10,125,627	102,713	629,039
35	7	100,312	725,381			7	10,150,941	101,884	730,923
36	8	99,238	824,620			8	10,176,318	101,066	831,989
37	9	98,177	922,796			9	10,201,759	100,257	932,245
38	10	97,126	1,019,922			10	10,227,263	99,457	1,031,702
39	11	96,087	1,116,009			11	10,252,831	98,666	1,130,368
40	12	95,059	1,211,068			12	10,278,463	97,885	1,228,253
41	13	94,042	1,305,109			13	10,304,160	97,112	1,325,365
42	14	93,035	1,398,145			14	10,329,920	96,349	1,421,714
43	15	92,040	1,490,185			15	10,355,745	95,594	1,517,308
44	16	91,055	1,581,240			16	10,381,634	94,848	1,612,156
45	17	90,081	1,671,320			17	10,407,588	94,111	1,706,267
46	18	89,117	1,760,437			18	10,433,607	93,383	1,799,650
47	19	88,163	1,848,601			19	10,459,691	92,662	1,892,312
48	20	87,220	1,935,821			20	10,485,840	91,951	1,984,263
49	21	86,287	2,022,107			21	10,512,055	91,247	2,075,510
50	22	85,363	2,107,471			22	10,538,335	90,552	2,166,062
51	23	84,450	2,191,921			23	10,564,681	89,865	2,255,928
52	24	83,546	2,275,467			24	10,591,093	89,186	2,345,114
53	25	82,653	2,358,120			25	10,617,570	88,515	2,433,629
54	26	81,768	2,439,888			26	10,644,114	87,852	2,521,481
55	27	80,893	2,520,781			27	10,670,725	87,197	2,608,678
56	28	80,028	2,600,809			28	10,697,401	86,549	2,695,228
57	29	79,171	2,679,980			29	10,724,145	85,909	2,781,137

Figure 13 - Two Scenarios of Market Capture (Partial View)

Problem 7: Charting

Re-create the Excel chart below (Figure14) that draws on the Forecasting worksheet data comparing the total customer base under each of the two scenarios.
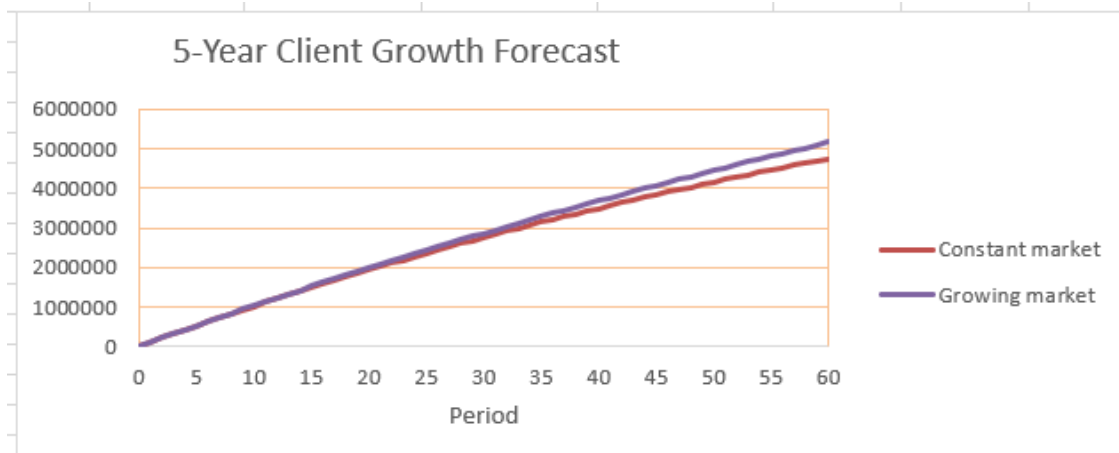

Figure 14 - Market Capture Projections

One way to easily create a chart like this is to select the column of values for "Total Customers" for the first scenario and create a simple chart.

- Select the data and select: **Insert** > **Insert Line Chart** > (There are several chart types available; you may use line or scatter chart type.)

- Now from the second scenario select the values from the "Total Customers" column and **copy** (CTRL/Command-C) to the Windows Clipboard.
- Click the edge of the existing chart and **paste** (CTRL/Command-V) the Clipboard values to add the second, comparison line.

- You can click anywhere on the chart to reveal the three tool buttons beside the chart; use the top tool to modify various chart elements.
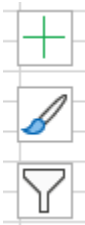
- Or, right-click on the specific area of the chart then select **Format Chart Area** options to refine your chart elements with all appropriate labels, etc. as per the example.

Enjoy!