

ITEC1010 Assignment #2 – Excel Spreadsheets

Submissions must be made via the correct Section link by the deadline.

- **Section. B Due Tuesday, Nov 19, 11PM – No Late Submissions Accepted**
- **Section. A & C Due Wednesday, Nov 20, 11PM – No Late Submissions Accepted**

When we create a worksheet model using a spreadsheet program such as Excel, we instruct the computer by providing steps it can take to solve the problem at hand. Problem solving in this context is how best to achieve the desired results using appropriate formulas and functions that are **flexible**, **elegant** and optimally **comprehensible/meaningful**. In this assignment you are asked to solve problems in Excel and submit the workbook containing all of the solutions.

IMPORTANT!!!!

- **Problem solutions must make full use of named 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 problems 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: **Design** 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 PROCEEDING

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)
3. Each problem must be solved in its own worksheet; please keep everything compact so that they are easily found and viewable when opened.
4. Rename each sheet tab with the specific problem **title**, e.g., Mortgage, Invoice, Movies, etc.
5. Use the data as provided in the examples to test your solutions.
6. Be sure to **include all required components** in appropriate format for each problem solution.
7. Up to 50% penalty will be applied for not using named ranges optimally.

Problem 1: Mortgage

1. Re-create 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 **rewrite** 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	\$350,000.00		Financed Amount	\$315,000.00
5		Deposit	\$35,000.00		Payment (Month)	\$1,396.97
6		Term (Yrs)	30		Total Payments	\$502,907.72
7		Interest Rate	3.40%		Total Interest	\$187,907.72
8						
9						
10		Interest Rate	Monthly Payment	Total Payments	Total Interest	
11		3.40%	\$1,396.97	\$502,907.72	\$187,907.72	
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., 7.50% is displayed for items when **Quantity** exceeds the **Discount Threshold** 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 applied to the **Subtotal**
- **Amount_Due** = the sum of **Subtotal** and **HST**

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

Example:

B	C	D	E	F	G
Sales Invoice					
Item	Quantity	List Price /unit	Discount	Sale Price /Unit	Total
Printer Ink	50	38.99	7.50%	36.07	1803.29
Paper Pack	24	9.29		9.29	222.96
File Folders	100	27.99	7.50%	25.89	2589.08
USB Sticks	39	12.99		12.99	506.61
				Subtotal	5121.93
				HST	665.85
Discount Rate 7.50%	Discount_Threshold 50	HST_Rate 13%			
				Amount Due	5787.78

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 **Top10.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 # 10 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 Redemption	Crime, Drama	Frank Darabont	9.3	1994
2	The Godfather	Crime, Drama	Francis Ford Coppola	9.2	1972
3	The Godfather: Part II	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 Rings: The Fellowship 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 and the Ugly	Western	Sergio Leone	8.8	1966
10	Fight Club	Drama	David Fincher	8.8	1999

Figure 4 - Database: Top10

Enter Rank # to Search:	10
Info	
Title	Fight Club
Rating	8.8
Year	1999
Genre	Drama
Director(s)	David Fincher

Figure 5 - Searcher

Problem 4: Estimates

A company purchases Olive oil according to this price schedule:

- For the first 1000 Litres, \$7.10 per Litre
- For any of the next 3000 Litres \$6.60 per Litre
- For any oil beyond 4,000 Litres, \$5.80 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.

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:

Purchase Estimates:				
			Ordered:	6,500
Purchase Price schedule:	Qty		Price	Total
First 1000 Ltrs.	Tier1:	1,000	@ 7.10	7,100
Next 3000 Ltrs.	Tier2:	3,000	@ 6.60	19,800
Above 4000 Ltrs.	Tier3:	2,500	@ 5.80	14,500
Total:		6,500	Total Price:	41,400

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

Purchase Estimates:				
			Ordered:	2,900
Purchase Price schedule:	Qty		Price	Total
First 1000 Ltrs.	Tier1:	1,000	@ 7.10	7,100
Next 3000 Ltrs.	Tier2:	1,900	@ 6.60	12,540
Above 4000 Ltrs.	Tier3:	-	@ 5.80	0
Total:		2,900	Total Price:	19,640

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

Purchase Estimates:				
			Ordered:	900
Purchase Price schedule:	Qty		Price	Total
First 1000 Ltrs.	Tier1:	900	@ 7.10	6,390
Next 3000 Ltrs.	Tier2:	-	@ 6.60	0
Above 4000 Ltrs.	Tier3:	-	@ 5.80	0
Total:		900	Total Price:	6,390

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 **Monthly_Sales.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
Irons	790,000	19,750	0	1.0%
Forrest	889,000	26,670	100,000	2.0%
Karim	923,000	27,690	400,000	2.5%
Forrest	973,000	29,190	800,000	3.0%
Enders	280,000	5,600	1,000,000	3.5%
Irons	339,000	6,780	1,500,000	4.0%
Qiu	485,000	12,125	2,000,000	4.5%
Irons	551,000	13,775		
Qiu	1,240,000	43,400		
Qiu	991,000	29,730		
Enders	1,277,000	44,695		
Irons	777,000	19,425		
Enders	262,000	5,240		
Karim	669,000	16,725		
Karim	700,000	17,500		
Forrest	1,399,000	48,965		

Figure 9 - Monthly Sales Table and Commission Lookup Table

Performance Table			
Associate	Properties Sold	Total Sales	Commission
Enders	3	1,819,000	55,535
Forrest	3	3,261,000	104,825
Irons	4	2,457,000	59,730
Karim	3	2,292,000	61,915
Qiu	3	2,716,000	85,255

Figure 10 - Performance Table

TOP Performer of the Month			
Total Sales	Associate	Properties Sold	Commission
3,261,000	Forrest	3	104,825

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
1	Forecasting and Charting			
2				
3	Total market potential			2,000,000
4	% remaining captured/period			1.2%
5	Market growth/period			0.30%
6				

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 2,000,000 customers. Each month you sign up 1.2% of customers in the market that have not yet signed up.

Scenario 2: Growing Market - Total market potential is initially 2,000,000 customers but grows at 0.3% per month. Each month you sign up 1.2% 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 take into account 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.

Hint: Whenever you need to reference a value calculated in a previous row you need to use its [cell address](#), not a range name; but remember that the rest of the formula should make use of named ranges.

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	24,000	24,000			1	2,000,000	24,000	24,000
30	2	23,712	47,712			2	2,006,000	23,784	47,784
31	3	23,427	71,139			3	2,012,018	23,571	71,355
32	4	23,146	94,286			4	2,018,054	23,360	94,715
33	5	22,869	117,154			5	2,024,108	23,153	117,868
34	6	22,594	139,749			6	2,030,181	22,948	140,816
35	7	22,323	162,072			7	2,036,271	22,745	163,561
36	8	22,055	184,127			8	2,042,380	22,546	186,107
37	9	21,790	205,917			9	2,048,507	22,349	208,456
38	10	21,529	227,446			10	2,054,653	22,154	230,610
39	11	21,271	248,717			11	2,060,817	21,962	252,573
40	12	21,015	269,732			12	2,066,999	21,773	274,346
41	13	20,763	290,495			13	2,073,200	21,586	295,932
42	14	20,514	311,009			14	2,079,420	21,402	317,334
43	15	20,268	331,277			15	2,085,658	21,220	338,554
44	16	20,025	351,302			16	2,091,915	21,040	359,594
45	17	19,784	371,086			17	2,098,191	20,863	380,457
46	18	19,547	390,633			18	2,104,485	20,688	401,146
47	19	19,312	409,946			19	2,110,799	20,516	421,661
48	20	19,081	429,026			20	2,117,131	20,346	442,007
49	21	18,852	447,878			21	2,123,482	20,178	462,185
50	22	18,625	466,503			22	2,129,852	20,012	482,197

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.

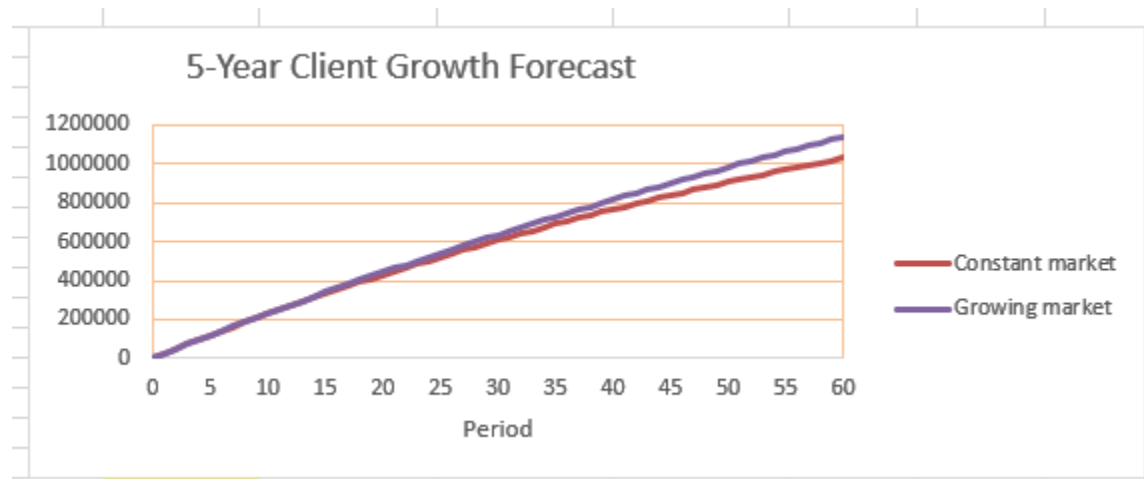


Figure 14 - Market Capture Projections

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!