

ITEC1010 Assignment #2 – Excel Spreadsheets

Due: August 2, 10 PM

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: **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 **one** Excel Workbook containing separate worksheets to each of the problems below.
2. Save the workbook as your full name, e.g., diana_prince.xlsx (all lowercase). Be sure to save your workbook as a normal Excel workbook file with .xlsx extension.
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, etc. (Ensure to keep everything compact so that they are easily 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. Always remember that up to 50% penalty will be applied for not using named ranges optimally.

Important note about named ranges in Office 365: Due some new features added to Excel, named references may result in #N/A errors. If these are returned because of names in your formulae, begin the named reference with an 'at' sign (@), e.g., @SALES instead of just SALES.

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 (BiWeekly)	=IFERROR(PMT(C7/26,C6*26,-C4--B5),0)			
6		Term (Yrs)			Total Payments	=IFERROR(E5*B6*26,0)			
7		Interest Rate			Total Interest	=IFERROR(E6-E4,0)			
8									

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* – B9:E11) and populate cells with appropriate labels and named references.
6. Format the whole model as per *Figure 2* including:
 - a. Model title font set to 12pts 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 of your choice
 - f. Bold face displayed data

	A	B	C	D	E	F
1		Mortgage Calculator				
2						
3		Initial Assumptions			Result	
4		Borrowed	\$ 400,000.00		Financed	\$ 360,000.00
5		Deposit	\$ 40,000.00		Payment (Bi-Weekly)	\$ 584.49
6		Term (Yrs)	30		Total Payments	\$ 455,904.05
7		Interest	1.64%		Total Interest	\$ 95,904.05
8						
9		Summary				
10		Interest	Bi-Weekly Payment	Total Payments	Total Interest	
11		1.64%	\$ 584.49	\$ 455,904.05	\$ 95,904.05	
12						

Figure 2

Problem 2: Staff Payroll

Re-create the **Staff Payroll** model below for weekly pay calculations with the format and features shown in *Figure 3*.

- Range names should correspond to their respective labels.
- Calculating the **Total_Pay (column J)** involves applying the following rules: hours worked amount that is 37 or less is calculated by multiplying it and the standard hourly rate; beyond that any extra hours up to 10 hours are calculated at time-and-half, or 50% more than the standard hourly rate; and hours logged greater than 47 are calculated at double-time, or 100% higher than the hourly rate.

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

Example:

	A	B	C	D	E	F	G	H	I	J
1	Staff Payroll		Week of	25-Feb						
2	Employee Last Name	Employee First Name	Employee ID No	Hourly Rate	Hours Worked	Time & Half Hours	Double Time Hours	Regular Pay	Overtime Pay	Total Pay
3	Abner	Heather	10-695	10.00	35			350		350.00
4	Bolen	Jiayi	12-731	19.25	37			712.25		712.25
5	Diep	Hieu	12-609	20.50	48	10	1	758.5	348.50	1107.00
6	Forrest	John	05-696	19.50	50	10	3	721.5	409.50	1131.00
7	Henderson	Frederick	10-315	19.25	52	10	5	712.25	481.25	1193.50
8	Irons	Andrew	03-155	22.75	53	10	6	841.75	614.25	1456.00
9	Karim	Farah	07-689	20.50	54	10	7	758.5	594.50	1353.00
10	Qiu	Loc	09-788	25.15	55	10	8	930.55	779.65	1710.20
11	Viegas	Stefan	11-010	19.50	56	10	9	721.5	643.50	1365.00
12										

Figure 3

Problem 3: Movies

Re-create the model below that search 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.

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

Rank	Title	Genre	Director(s)	Rating	Year
1	The Godfather	Crime, Drama	Francis Ford Coppola	9.2	1972
2	The Shawshank Redemption	Crime, Drama	Frank Darabont	9.3	1994
3	Schindler's List	Biography, Drama, History	Steven Spielberg	8.9	1993
4	Raging Bull	Biography, Drama, Sport	Martin Scorsese	8.2	1980
5	Casablanca	Drama, Romance, War	Michael Curtiz	8.5	1942
6	Citizen Kane	Drama, Mystery	Orson Wells	8.3	1941
7	Gone With The Wind	Drama, History, Romance	Victor Fleming George Cukor, Sam Wood	8.1	1939
8	The Wizard of Oz	Adventure, Family, Fantasy	Victor Fleming George Cukor, Mervyn LeRoy, Norman Taurog	8	1939
9	One Flew Over The Cuckoo's Nest	Drama	Milos Forman	8.7	1975
10	Lawrence of Arabia	Adventure, Biography, Drama	David Lean	8.3	1962

Figure 3 - Database: Top10

Enter Rank # to Search:	8
Info	
Title	The Wizard of Oz
Rating	8.0
Year	1939
Genre	Adventure, Family, Fantasy
Director(s)	Victor Fleming George Cukor, Mervyn LeRoy, Norman Taurog, Richard Thorpe, King Vidor

Figure 4 - Searcher

Problem 4: Tier Pricing

A company purchases iBuddy toys according to this price schedule:

- For the first 1000, \$9.20 per unit
- For any of the next 3000 \$8.80 per unit
- For any order beyond 4,000 , \$8.50 per unit

The Tier Pricing spreadsheet calculates the total price of buying x iBuddy units, where x is a number input to a cell (**Ordered, e.g., cell F2**) on the worksheet with values that may fall into any or all 3 Tiers of pricing; Total is the total of **Qty** (e.g., **C4:C6**).

Re-create the model as per below:

1. One model must be able to handle all 3 possible tiers of order scenarios.
2. Format with differentiating colors as per example below.

Key functions to use: **IF (nested)**

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

	A	B	C	D	E	F
1	Tier Pricing:					
2					Ordered:	1,000
3	Purchase Price schedule:		Qty		Price	Total
4	1 to1000 Units.	Tier1:	1,000	@	9.20	9,200
5	1001 to 4000 Units	Tier2:	-	@	8.80	0
6	4001 + Units	Tier3:	-	@	8.50	0
7		Total:	1,000		Total Price:	9,200

Figure 5 - Scenario1: Tier 1

	A	B	C	D	E	F
1	Tier Pricing:					
2					Ordered:	3,000
3	Purchase Price schedule:		Qty		Price	Total
4	1 to1000 Units.	Tier1:	1,000	@	9.20	9,200
5	1001 to 4000 Units	Tier2:	2,000	@	8.80	17,600
6	4001 + Units	Tier3:	-	@	8.50	0
7		Total:	3,000		Total Price:	26,800

Figure 6 - Scenario2: Tier 2

	A	B	C	D	E	F
1	Tier Pricing:					
2					Ordered:	4,001
3	Purchase Price schedule:		Qty		Price	Total
4	1 to1000 Units.	Tier1:	1,000	@	9.20	9,200
5	1001 to 4000 Units	Tier2:	3,000	@	8.80	26,400
6	4001 + Units	Tier3:	1	@	8.50	9
7		Total:	4,001		Total Price:	35,609

Figure 7 - Scenario: Tier 3

Problem 5: Commissions

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

- Download/import the **MonthlySales.csv** and complete the **Monthly_Sales** table (Figure 9 Left) used to record each Sales'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 Sales Region'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 **Region**; **Properties_Sold**; **Commision_Earned**.

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

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

Figure 8 - Monthly Sales Table and Commission Lookup Table

Region	Properties Sold	Total Sales	Commissions Accrued
East	4	4,979,000	186,930
North	4	3,503,000	113,555
South	5	4,582,000	136,430
West	3	2,481,000	66,980

Figure 9 - Performance Table

TOP Performer of the Month			
Top Sales	Region	Properties Sold	Commissions Accrued
4,979,000	East	4.0	186,930

Figure 10 - Top Performer of the Month

Problem 6: Forecasting

You have an idea for a new service that offers customized products 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		10,000,000
4		% remaining captured/period		1.07%
5		Market growth/period		2.50%

Figure 11 - 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 1.07% 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 2.5% per month. Each month you sign up 1.07% 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.

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.

	A	B	C	D	E	F	G	H	I	J
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	0	
29	1	107,000	107,000			1	10,000,000	107,000	107,000	
30	2	105,855	212,855			2	10,143,000	107,385	214,385	
31	3	104,722	317,578			3	10,289,190	107,800	322,186	
32	4	103,602	421,179			4	10,438,619	108,246	430,431	
33	5	102,493	523,673			5	10,591,339	108,722	539,153	
34	6	101,397	625,070			6	10,747,401	109,228	648,381	
35	7	100,312	725,381			7	10,906,857	109,766	758,147	
36	8	99,238	824,620			8	11,069,763	110,334	868,481	
37	9	98,177	922,796			9	11,236,173	110,934	979,416	
38	10	97,126	1,019,922			10	11,406,143	111,566	1,090,982	
39	11	96,087	1,116,009			11	11,579,730	112,230	1,203,211	
40	12	95,059	1,211,068			12	11,756,994	112,925	1,316,137	
41	13	94,042	1,305,109			13	11,937,993	113,654	1,429,791	
42	14	93,035	1,398,145			14	12,122,789	114,415	1,544,206	
43	15	92,040	1,490,185			15	12,311,444	115,209	1,659,415	
44	16	91,055	1,581,240			16	12,504,021	116,037	1,775,452	
45	17	90,081	1,671,320			17	12,700,584	116,899	1,892,351	
46	

Figure 12 - Two Scenarios of Market Capture (Partial View)

Problem 7: Charting

Re-create the Excel chart below (Figure 14) that draws on the Forecasting worksheet data comparing the total customer base under each of the two scenarios.



Figure 13 - 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-C or Command-C) to the system Clipboard.
- Click the edge of the existing chart and **paste** (CTRL-V or 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 (or choose the option from the tool bar) to modify various **chart elements**.



Chart Elements



Chart Styles



Chart Styles

- 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!