



## Course Assignment

### Using Microsoft Excel for Data Management, Problem Solving & Decision Analysis

#### Assignment Objectives:

The objective of this assignment is to get you familiarized with selected functions and features in Microsoft Excel that can help in a variety of data management, problem solving and decision analysis contexts. Toward this, each assignment exercise requires you to complete specific procedures with outlined steps to accomplish stated outcomes. In addition to advancing your knowledge of Microsoft Excel as a tool, a complementary objective of this assignment is to foster your analytical thinking and logical reasoning skills.

#### Help & References:

You will be provided with various tutorial examples in class lectures and scheduled lab sessions to illustrate many of the techniques and methods that this assignment is based on. Your coursepack also includes useful examples of features and functions of Microsoft Excel that you will utilize in this assignment. Additionally, as shown in class, the Excel Help Engine provides contextualized instructions on various Excel features and functions, and you are encouraged to make use of these as you progress through the assignment. Lastly, you are welcome to use any online tutorials and screencasts that you might find helpful in completing the different exercises in this assignment.

#### Submission Instructions & Guidelines:

- This assignment is due by the end of (midnight) **Sunday, March 12<sup>th</sup> 2017**.
- This is a group assignment (2 students per group), and it is the responsibility of your designated team leader to **submit your completed work package (zipped archive) as specified below**.
- Each assignment must be submitted as an electronic **zip file**<sup>1</sup> with the Excel workbooks from all the exercises. Additionally, each member of your team should complete the **personal ethics and work statement form** that appears on the next page (also provided separately as a word document). This single page should be completed and included in your zipped archive submission.
- **Please remember that it is your individual as well as group responsibility to verify the contents of your submission. No excuses for missing or incorrect files or submission errors due to negligence will be tolerated.**
- Your zip file should be submitted via the blackboard course website using the online submission form. In the comments text box of the online submission form, please write:  
**Excel Assignment from <Group ID>: <Your First & Last Name> and <Your Team Member's First & Last Name>**

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<sup>1</sup> If you don't know how to create a zip file, please conduct a search Google specifying your operating system details. For example, you can search for "How to create a zip file in Windows 8" or "How to create a zip file on a Mac".

## Personal Ethics & Work Statement

By typing my name below, I am attesting to the fact that I have reviewed not only my own work, but the work of my colleagues, in its entirety.

I attest to the fact that my own work in this project meets all of the rules of quotation and referencing in use at the Telfer School of Management at the University of Ottawa, as well as adheres to the fraud policies as outlined in the Academic Regulations in the University's Undergraduate Studies Calendar. <http://www.uottawa.ca/academic-regulations/academic-fraud.html>

To the best of my knowledge, I also believe that each of my group colleagues has also met the rules of quotation and referencing aforementioned in this Statement.

I understand that if my group assignment is submitted without a signed copy of this Personal Ethics Statement from each group member, it will be interpreted by the Telfer School that the missing student(s) signature is confirmation of non-participation of the aforementioned student(s) in the required work.

We, the undersigned:

- warrant that the work submitted herein is our own group members' work and not the work of others
- acknowledge that we have read and understood the University Regulations on Academic Misconduct
- acknowledge that it is a breach of University Regulations to give or receive unauthorized and/or unacknowledged assistance on a graded piece of work

**Student Names (typed):**

1.	
2.	

**Group Number (typed):**

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## Assignment Legend

Assignment Exercises		Points Allocated
Excel Lab 1 Exercises 1, 2 & 3	<ul style="list-style-type: none"> <li>Please follow the instructions in the Excel files posted online.</li> </ul>	<b>15</b> (5 x 3)
Excel Lab 2 Exercises 1, 2 & 3	<ul style="list-style-type: none"> <li>Please follow the instructions in the Excel files posted online.</li> </ul>	<b>15</b> (5 x 3)
Excel Lab 3 Exercises 1 & 2	<ul style="list-style-type: none"> <li>Please follow the instructions in the Excel files posted online.</li> </ul>	<b>16</b> (8 x 2)
Excel Lab 4 Exercises 1 & 2	<ul style="list-style-type: none"> <li>Please follow the instructions in the Excel files posted online.</li> </ul>	<b>12</b> (6 x 2)
Assignment Homework Exercises I to III	<ul style="list-style-type: none"> <li>Instructions for assignment homework exercises are provided in this document.</li> </ul>	<b>36</b> (12 x 3)
Overall Formatting & Presentation	<ul style="list-style-type: none"> <li>Above &amp; beyond the requirements in the assignment exercises, points may be awarded or deducted for proper numerical and textual formatting (e.g. currency, percentages) and appropriate visual presentation (e.g. column &amp; row headers). Hence, you are encouraged to enhance the logical and visual presentation of your assignment deliverables.</li> </ul>	<b>6</b>
$\Sigma$		<b>100</b>

## Assignment Homework Exercise I

Data File needed for this Exercise: **Cool\_Water.xlsx**

**Cool Water Company** is a small independent water company in St. Louis, Missouri, and provides water to its commercial customers throughout the region, delivering the supply of water through pipelines, on-demand storage tanks, and bottles. Customers of Cool Water range from government offices to non-profit organizations to commercial retail shops and markets. Town regulations indicate that the latter group of commercial customers is taxed on their usage, whereas non-profit and government offices are not. Furthermore, Cool Water will, from time to time, choose to waive a water bill based on its charitable giving policy. Bill Barnes is in charge of the billing system that must take into account these business rules and ensure accurate and on-time billing, which is completed each quarter.

*Complete the following tasks as specified below:*

1. Download and open the *Cool\_Water.xlsx* file from the course website. The *Reference\_Data* worksheet is protected and should not be modified directly.
2. Copy columns A to G from the reference data worksheet to a new worksheet (name it *Quarterly Data*). In the *Quarterly Data* worksheet, create an Excel table for the range **A1:G73**.
3. Format the **Gallons Used** data using a Comma Style number format with no decimal places.
4. Add the following three columns to the table: **Water Bill**, **Tax**, and **Total Bill**.
5. Calculate the Water Bill based on the following rules:
  - If a customer's bill is waived, place 0 in the Water Bill column
  - Gallons Used must be greater than 25,000 gallons during the quarter; otherwise, the water bill is 0.
  - For all other accounts, the billing rate varies based on the type of customer. The billing rate is \$3, \$2, or \$1.50 per *thousand* gallons used depending on the type of customer (see the Rates in columns O and P in the reference data worksheet). For example, a commercial customer using 75,000 gallons has a water bill of \$225 (75x\$3), whereas a government customer using 100,000 gallons pays \$150 (100x\$1.50). A commercial customer using 15,000 gallons has a water bill of 0.
6. Calculate Tax based on the following rule:
  - If a customer is taxable, then multiply the water bill times 3.5% (given in cell P10 in the reference data worksheet); otherwise, the tax is 0.
7. Calculate the **Total Bill** amount using the following formula: **Water Bill + Tax**.
8. Improve the formatting of the number fields in the three new columns that were added in the previous three steps, and then insert average and sum aggregates for **Gallons Used (average)** and **Total Bill (sum)** at the bottom of the appropriate columns.

9. Make a copy of the completed Quarterly Data worksheet and name it *Usage Highlights*. In the *Usage Highlights* worksheet, remove the totals row from the bottom of the table. Then use **conditional formatting** to highlight the top 15% of customers based on their total bill. Use Green-on-Green format or another legible format to highlight the cells in the total bill column where the top 15% criteria are met.

10. Insert a new worksheet and then create the Water Usage & Billing by Customer Type report (as shown below). Rename the worksheet as *Billing Summary*. Use conditional functions **COUNTIF**, **AVERAGEIF** and **SUMIF** to prepare this report. Format the values and presentation of the cells in your worksheet as shown below.

Customer Type	Number of Customers	Average Gallons Used	Total Billed
Commercial	37	322,437	\$37,043.12
Government	24	774,532	\$27,901.44
Non-Profit	11	87,661	\$224.18
<b>Total</b>	72	1,184,629.71	\$65,168.74

## Assignment Homework Exercise II

Data File needed for this Exercise: **ABC\_Toys.xlsx**

**ABC Toys Inc.** manufactures various types of toy products (Toys A – E). The manufacturing process for all toys is similar in that each toy requires similar manufacturing material including paint, plastic, wood, and glue. The number of units of each material required per unit of production for each toy is provided in the *ABC\_Toys.xlsx* workbook, along with the profit per unit of production of each type of toy. The spreadsheet also includes the maximum quantity available for all manufacturing material in the next production period.

Given the material requirements for production of each toy, the profit yield from each toy, and the material availability constraints, your task is to determine the optimal mix of products that ABC Toys should produce in the next time period. Toward this, you will use the **Solver** tool as follows:

- You can setup the Solver solution in the same worksheet (Production-Data) or a new one.
- Setup placeholder cells for the production quantities of Toys A – E. These cells will act as the changing cells in the solver tool.
- Using the placeholder cells and the profit values of each toy, designate and formulate a cell that holds the total profit from the production of the toys. This cell will act as the target cell (objective function) in the solver tool.
- Using the placeholder cells for the production quantities, designate and formulate cells that contain the total quantity of material required for red paint, blue paint, white paint, plastic, wood, and glue. These cells will act as the comparison cells for the material availability constraints identified in the spreadsheet.
- Open the solver tool and specify the target cell, changing cells, and constraints along with other parameters for obtaining a linear programming solution to this optimization problem.

## Assignment Homework Exercise III

Data File needed for this Exercise: *Sales\_Dashboard.xlsx*

Wavelength Corp has recently acquired a startup firm that sells workforce collaboration software. The startup firm has only been in operation for a year and has only had two months of sale to date. Therefore, the recordkeeping and analytics of the new acquisition are shoddy, and this is where you come in. You are required to formulate a quick sales dashboard based on the two months of sales that the acquisition has provided you with. The raw sales logs can be found in the *Sales\_Dashoboard.xlsx* workbook.

A snapshot of the design of the desired sales dashboard is shown in the *Final\_Dashboard\_Snapshot* worksheet. To create such a dashboard, you are required to complete the following tasks as specified below:

1. Download and open the *Sales\_Dashoboard.xlsx* file from the course website. The *Reference\_Data* worksheet is protected and should not be modified directly.
2. Copy over columns A to D from the *Reference\_Data* worksheet to the *Dashboard* worksheet (starting at cell A1).
3. Format the newly copied range as follows:
  - The values in the sales columns as currency with \$ symbol and commas, but without any decimals.
  - The headers for each column using white on black formatting (see *Final\_Dashboard\_Snapshot*).
4. Add a new column to calculate the percentage change in the sales between the months of January & February as follows:
  - **Formula:**  $(\text{Feb Sales} - \text{Jan Sales}) / \text{Jan Sales}$
  - Format: Percentage with two decimals
  - Add a Header called *Trend* for this new column
5. Add a new column to display the symbol for the trend as follows:
  - If the value in the percentage column is **greater than or equal to 0.10**, then use the ▲ symbol (as in cell N4)
  - If the value in the percentage column is **less than or equal to -0.10**, then use the ▼ symbol (as in cell N5)
  - Otherwise, use the ■ symbol (as in cell N6)

You will use the **IF** function to complete the first entry in this new column of symbols and then use auto-fill to fill the entries in the cells below.

  - Use the **Merge & Center** control to the Trend Header so that it spans the top cells in the percentage change column and the symbols column (see *Final\_Dashboard\_Snapshot*).
6. Use **Multi-level custom sort** to organize the entire range of sales information such that the range is sorted first on the Regions column and then on the Markets column.
7. Use the **Subtotal** control to show the **average** of the Trend at every change in region.

8. Use the **Subtotal** control (yes, again) to show the **sum** of Jan Sales and Feb Sales at every change in region. Such an arrangement should make it easy to observe the monthly sales for each region. Since you still want the subtotal output from the previous step, make sure that you **uncheck** “Replace Current Subtotals” in the Subtotal dialog box (see *Final\_Dashboard\_Snapshot*).

9. Make the following modifications to the newly added rows for Regional and Grand Subtotals:

- Autofill the percentage change values in the subtotal rows with sums from Jan Sales and Feb Sales.
- Autofill the trend symbols values in the subtotal rows with the sums and the averages.
- Re-label the Subtotal rows by changing the text in the left-most cells for the subtotal rows as follows:
  - North Total Sales
  - North Average Trend
  - South Total Sales
  - South Average Trend
  - Grand Total
  - Grand Average Trend
- Recalculate the Trend % values in cells E20 and E21 using the correct formula. Note that these values may be non-existent or incorrect initially due to the sequence of subtotal procedures. The correct values are shown in the *Final\_Dashboard\_Snapshot*
- Use light grey background shading for the rows with North and South Sales and Averages subtotals.
- Use light blue background shading for the rows with the Grand Total and Average subtotals.

10. Apply **conditional formatting** to the cells with values for Jan Sales and Feb Sales (except any of the subtotal cells). In the dashboard snapshot, the ranges for conditional formatting are C2:D8 and C11:D17.

*Note: Holding the control key between selecting the first range and selecting the second range will highlight both non-contiguous ranges.*

The conditional formatting that needs to be applied to these cells is dependent upon the sales value in the cells as follows:

- If the sales value is greater than 200,000, then the color scheme for the cell should be dark green on light green with bold font.
- If the sales value is lesser than 100,000, then the color scheme for the cell should be dark red on light red with bold font.

In the conditional formatting dialog box, you will use the “Use a Formula to determine which cells to format” option, and point to the first cell in the formatting range using a relative reference and append the comparison criteria as noted above.



**11.** Apply **conditional formatting** to the cells with the trends symbols column.

The conditional formatting that needs to be applied to these cells is dependent upon the symbol in the cells:

- If the symbol is ▲ (as in cell N4), then use dark green font color
- If the symbol is ▼ (as in cell N5), then use dark red font color

In the conditional formatting dialog box, you will use the “*Format only cells that contain*” option, and the Cell value “Equal to” rule to point to cells N4 and N5.

**12.** Copy over the Market column and the Feb Sales column from the *Reference\_Data* worksheet into the *Dashboard* worksheet (starting at cell H1).

**13.** Format the headers of the newly copied range (white on black), and **sort** the range by the values in the Market column. *Please note that if you can't seem to sort the data in this worksheet, you may have to copy the data into a new temporary worksheet, perform your sorting there, and copy the sorted data back into the Dashboard worksheet.*

**14.** In the cell to the right of the first Feb Sales entry (cell J2), enter a formula that displays a bar such that the bar's length is based on the value of Feb Sales. To do this, you will use the repeat ( **REPT** ) function as follows:

- You will repeat the symbol in cell M17 (using an absolute reference) n times, where  
 $n = \text{Feb Sales} / 10000$ .
- Auto-fill

**15.** Apply **conditional formatting** to the cells with the bars.

The conditional formatting that needs to be applied to these cells is dependent upon the sales value in the corresponding Feb Sales cells as follows:

- If the sales value is greater than 200,000, then the font color for the bar cell should be dark green.
- If the sales value is lesser than 100,000, then the font color for the bar cell should be dark red.

In the conditional formatting dialog box, you will use the “*Use a Formula to determine which cells to format*” option, and point to the first cell in the Feb Sales column using a relative row reference (column fixed) and append the comparison criteria as noted above.

**16.** Format your dashboard by using borders around all data cells and by resizing all columns to make sure information contained is visible (see *Final\_Dashboard\_Snapshot*).