Northeastern University
Khoury College of
Computer Sciences

CS1100: Assignment 2

Summarizing and Formatting Data, Problem Solving

To complete this assignment you must submit an electronic copy to BlackBoard by the due date. Download the starter file and save the file under the name *CS1100.LastName.A2* where LastName is your last name.

To download a file from Google Drive, click the download button -- do not open the file in Google.

Knowledge Needed

This lab requires the following Excel functions and techniques

- Named ranges
- Borders, general formatting, number formatting, conditional formatting
- **SUM, AVERAGE, MIN, MAX** and other basic functions such as multiplication to calculate summary statistics of a range
- **ROUND** to round the value in a cell

Problem 1 (60 Points)

In the worksheet "Franchises" you are given pertinent data for *All Greens* franchises. Before you begin, inspect the "solution" shown on the next page. Each row represents one franchise which has multiple stores.

1. Delete the *Num Sq-Ft* column.

2. After inserting a new column to the left of column A, create the following named ranges:

    a. Annual Net Sales in cells B4:B22 named "AnnualSales". Note that the sales data is in $1000s, so 231 is actually $231,000.

    b. Inventory in cells C4:C22 named "Inventory"

    c. Ad Budget in cells D4:D22 named "AdBudget"

    d. Num Stores in cells E4:E22 named "NumStores"

3. Calculate the average, maximum, and minimum values for each data vector in rows 23 through 25. Do **not** use named ranges but rather make your formulas copyable across.

4. Add a new worksheet "Summary" and calculate the average and range values using the named ranges and use rounding to the nearest whole numbers. Express your result in actual numbers not in $1,000's. See the layout below.

5. In the original "Franchises" worksheet, add a new column called "Sales Per Store" that calculates the annual net sales per store, i.e., Annual Net Sales divided by Num Stores.

6. Using conditional formatting, highlight those stores whose *Sales Per Store* is less than $10,000.

7. Adjust the formatting and layout as shown below. The font for the title is "Comic Sans MS" and bold. Choose colors that approximate what is shown. The headers for the columns are bold and the average, min, and max values are italics.

Your solution must take into account the possibility that the data could change, *i.e.*, do not "hard code" any cell references or data values. If new rows are inserted or existing rows are deleted, your spreadsheet model should still work. Below is the final layout for the "Franchises" worksheet.

	A	B	C	D	E	F
1	Sales for All Greens Franchises					
2						
3		Annual Net Sales	Inventory	Ad Budget	Num Stores	Sales Per Store
4		$ 231.00	$ 294.0	$ 8.20	11	$ 21.00
5		$ 156.00	$ 232.0	$ 6.90	12	$ 13.00
6		$ 10.00	$ 149.0	$ 3.00	15	$ 0.67
7		$ 519.00	$ 600.0	$ 12.00	1	$ 519.00
8		$ 437.00	$ 567.0	$ 10.60	5	$ 87.40
9		$ 487.00	$ 571.0	$ 11.80	4	$ 121.75
10		$ 65.00	$ 168.0	$ 4.70	11	$ 5.91
11		$ 98.00	$ 151.0	$ 4.60	10	$ 9.80
12		$ 398.00	$ 342.0	$ 5.50	4	$ 99.50
13		$ 161.00	$ 196.0	$ 7.20	13	$ 12.38
14		$ 397.00	$ 453.0	$ 10.40	7	$ 56.71
15		$ 497.00	$ 518.0	$ 11.50	1	$ 497.00
16		$ 528.00	$ 615.0	$ 12.30	3	$ 176.00
17		$ 99.00	$ 278.0	$ 2.80	14	$ 7.07
18		$ 124.58	$ 142.0	$ 3.10	12	$ 10.38
19		$ 347.00	$ 461.0	$ 9.60	6	$ 57.83
20		$ 341.00	$ 382.0	$ 9.80	5	$ 68.20
21		$ 507.00	$ 590.0	$ 12.00	10	$ 50.70
22		$ 400.00	$ 517.0	$ 7.00	8	$ 50.00
23	Average	$ 305.40	$ 380.32	$ 8.05	8	$ 98.12
24	Min	$ 10.00	$ 142.00	$ 2.80	1	$ 0.67
25	Max	$ 528.00	$ 615.00	$ 12.30	15	$ 519.00

and this is what's in the worksheet "Summary"

	A	B
1		
2	Average Annual Net Sales	$ 305,399
3	Range of Annual Net Sales	$ 518,000
4		
5	Average Inventory	$ 380,316
6	Range of Inventory	$ 473,000
7		
8	Average Ad Budget	$ 8,053
9	Range of Ad Budget	$ 9,500
10		
11	Average Number of Stores	8
12	Range of Number of Stores	14
13		
14	Average Sales Per Store	$ 98,122
15	Range of Sales Per Store	$ 518,333

Problem 2 (40 Points)

Satisfying a set of constraints while maximizing an objective function is a common problem to be solved with computers. While there are standard tools for such problems we use Excel to solve such a maximization problem.

Solve the following stock distribution problem. A company owner has decided to distribute the 1000 shares of stock she owns in her company among her four children. Shares cannot be subdivided into fractional shares. The stock distribution has to satisfy the following constraints:

1. The 1st child gets twice as many shares as the 2nd child.
2. The 3rd child gets more shares than the first two together.
3. The 4th child gets less than the second child.
4. The sum of all distributed shares must be 1000.

The objective function is to maximize the number of shares the fourth child gets while all constraints are satisfied.

In the same workbook as Problem 1, create a spreadsheet (worksheet) named *StockDistribution*. In cells A1, B1, C1, D1, and E1 put the labels defining what the values will mean: Child 1, Child 2, Child 3, Child 4, and Total. In cells A2, B2, C2, D2, and E2 there should be formulas that express the constraints above and you should try to find the maximum for the 4th child.

What you practice: Expressing dependencies between columns, copying formulas down columns, translating English to spreadsheet formulas, problem solving with spreadsheets.

Your solution approach should be general so that it can be used for distributing, say 500 or 1200 shares.

Your solution consists of the worksheet *StockDistribution* which correctly finds the maximum for 1000 shares.