Honor Code Pledge

The information provided in this exam is my own work. I have not received information from another person while doing this exam.

Your Name _____

Your Signature _____

Write your solutions in a single Word document and convert to PDF file. Cut and Paste all your answers using screen captures. Show all your work. Label your file with your last name and CEE3804. Email the solution to vuela@vt.edu and to Carol (yqliang@vt.edu).

Problem 1 (25 Points)

An engineer formulates a linear programming problem as follows:

Maximize

$$Z = 40x_1 + 70x_2$$

subject to:

$$x_2 \leq 135$$
$$x_1 + 1.8x_2 \leq 300$$

and the non-negativity constraints x1 >= 0 and x2 >= 0

a) Formulate the problem in standard Linear Programming form to solve the problem using the Simplex Method (add slack and artificial variables as needed)

b) Find the first two **tables** of the solution using the Simplex Method. This includes the first table with the initial solution and the second table with one iteration.

Problem 2 (25 Points)

c) Use **Excel Solver** to obtain the optimal solution of Problem 1. State the optimal value of Z and the values of x_1 and x_2.

Show screen captures of your Excel Solver solution.

Problem 3 (25 Points)

A file named cruiseLine_Data.xls contains information about passenger cruise ships that operated at US ports between 2004 and 2012. A sample of the data is presented below.

North American Cruises, January 1, 2004 - March 31, 2012							
Cruise Line	Vessel Name		Sail Date	Departure Port	Destination	Nights	Passengers
Carnival Cruise Line	CARNIVAL IMAGINATION		1/1/04	Miami	Western Caribbean	4	2,449
Royal Caribbean International	ENCHANTMENT OF THE SEAS		1/1/04	Fort Lauderdale	Western Caribbean	4	2,262
Carnival Cruise Line	CARNIVAL FANTASY		1/1/04	Port Canaveral	Bahamas	3	2,636
Carnival Cruise Line	CARNIVAL SENSATION		1/1/04	Tampa	Western Caribbean	4	2,483
Celebrity Cruise Line	CELEBRITY GALAXY		1/2/04	San Juan	Southern Caribbean	7	1,644
Royal Caribbean International	MAJESTY OF THE SEAS		1/2/04	Miami	Bahamas	3	2,570
Carnival Cruise Line	CARNIVAL SPIRIT		1/2/04	Miami	Southern Caribbean	8	2,324
Carnival Cruise Line	CARNIVAL ECSTASY		1/2/04	Long Beach	Mexico (Pacific)	3	2,474
Carnival Cruise Line	CARNIVAL FASCINATION		1/2/04	Miami	Bahamas	3	2,484
Princess Cruises	CORAL PRINCESS		1/2/04	Fort Lauderdale	Western Caribbean	10	1,982

a) Use a Pivot table to summarize the average number of nights per trip by cruise line. Which cruise line has the highest average nights per trip?

b) Use a pivot chart to summarize the average number of passengers per cruise trip (i.e., passenger column) and by cruise line.

Show screen captures of your summary tables.

Problem 4 (25 Points)

Steel cables are key components of suspension bridges to support the horizontal roadway/transit loads. For simplicity, we assume a uniformly distributed load along the horizontal span of the bridge. The tension at mid-span of the suspension bridge is given by the formula:

$$H = \frac{wL^2}{8d}$$

where:

H = Mid-span tension (Newtons)

w = Load per horizontal distance (N/m)

L = bridge span (m)

d = sag of supension bridge cable (m)

Write a simple **function** in Excel to calculate the value of H given values of w, L and d (arguments of the function). Test the function and state the answer using the following values:

w = 30,000 N/m.

L = 100 meters

D = 20 meters

Show a screen capture of your Excel function in VBA.