EGR 120 Due date: _____
Introduction to Engineering (See Due Dates Table)
File: N120H6M

Homework Assignment #6 (Excel A)

Reading Assignment:

Read Chapter 14 in Engineering Fundamentals – An Introduction to Engineering, 3rd Edition by Moaveni.
The following Excel Examples (passed out in class or available from the instructor's web page):

- ***Example 1: Using Tables in Microsoft Excel***
- ***Example 2: Using Tables in Microsoft Excel***
- ***Using Special Symbols in Microsoft Excel***

Computer Assignment:

Complete the assignment described below. Use only one file to store all four parts of the assignments by placing each part on a different sheet (Sheet1, Sheet2, Sheet3, Sheet4 – renamed as Problem 1, Problem 2, Problem 3, Problem 14.5) within the file. Attach the Excel file to an email and submit it by the assigned due date. ***This assignment must be submitted by email.***

1. Generate a table to calculate the distance, velocity, and acceleration for a particle using several values of t as defined below:

   t = 0.0 to 4.0 in increments of 0.2 (enter these values using Speed Fill)

   $x(t) = 14.7t^3 + 50t^2$ (enter the equation and copy it)

   $v(t) = 44.1t^2 + 100t$ (enter the equation and copy it)

   $a(t) = 88.2t + 100$ (enter the equation and copy it)

   Other important notes:

   - Your output should appear as shown below
   - Include your name, the course number, the assignment number, and the problem number
   - Use the same line types in boxing the table
   - Center the columns
   - Use one digit after the decimal point in each column
   - Display the formulas/contents of the first line of calculations below the table

   Output:

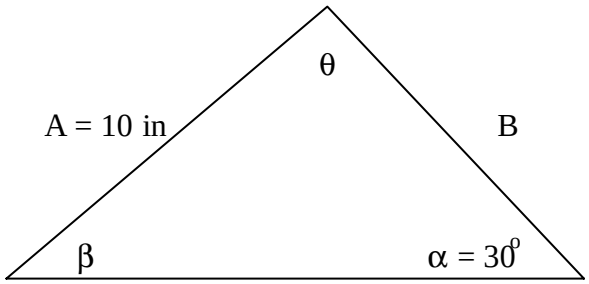
   John Doe (**your name**)
   EGR 120
   Homework Assignment #6, Problem 1
   Table 1: Distance (X), Velocity (v), and Acceleration (a) for a particle
   Calculations for this table are based on the following formulas:
   (show the three formulas listed above using Microsoft Equation)

t (s)	x (m)	v (m/s)	a (m/s^2)
0.0			
0.2			
.			
4.0	1740.8	1105.6	452.8

   Contents/Formulas for first line of calculations:

   t: A17 = (show the appropriate formula and cell address) Note: Use **your** row number
   x: B17 = (show the appropriate formula and cell address)
   v: C17 = (show the appropriate formula and cell address)
   a: D17 = (show the appropriate formula and cell address)

2. Generate a table to calculate side B, angle β, and angle θ for the triangle shown while side C varies from 1 inch to 15 inches.



C (varies from 1 in to 15 in)

Analyzing the triangle above using the law of sines yields the following relationships:

Formula 1: $\frac{\sin(\theta)}{C} = \frac{\sin(30)}{10}$ so $\theta = \sin^{-1}\left(C \cdot \frac{\sin(30)}{10}\right)$ (remember that trig functions use radians)

Formula 2: $\beta = 180 - 30 - \theta$ (in degrees)

Formula 3: $B = \frac{A \cdot \sin(\beta)}{\sin(30)}$

Note: As in Problem 1, use proper formatting, centering, line types, Greek letters, etc., as shown below.

Output:

John Doe (**your name**)
EGR 120
Homework Assignment #6, Problem 2
Table 2: Sides and angles for a triangle
(Use the Microsoft Drawing Tools to draw the figure shown above)
The figure above will be analyzed as C varies from 1 to 15 inches using the following:
(Use Microsoft Equation to generate Equations 1, 2, and 3 above).

C (in)	θ (degrees)	β (degrees)	B (in)
1	2.9	147.1	10.9
2			
3			
.			
.			
15			

Contents/Formulas for first line of calculations:

C: A17 = (show the appropriate formula and cell address) Note: Use **your** row number
θ: B17 = (show the appropriate formula and cell address)
β: C17 = (show the appropriate formula and cell address)
B: D17 = (show the appropriate formula and cell address)

3. Generate a table to calculate the quantities X_C, X_L, Z, and p.f. for a series RLC circuit using values of f as indicated below:
f = 100, 200, 500, 1000, 2000, 5000, 10000, 20000, 50000, and 100000 (enter these values)

$$X_C = \frac{1}{2 \cdot \pi \cdot f \cdot C} \qquad X_L = 2 \cdot \pi \cdot f \cdot L$$

$$Z = \sqrt{R^2 + (X_C - X_L)^2} \qquad p.f. = \sin^{-1}\left(\frac{X_L - X_C}{Z}\right)$$ **(express p.f. in degrees, not radians)**

The values of R, L, and C are constants that should also be entered into the spreadsheet and used in the formulas above. ***Absolute addresses*** should be used when referring to the cells containing these constants.
Note: As in Problem 1, use proper formatting, centering, line types, etc., as shown below.
Output:

John Doe (**your name**)
EGR 120
Homework Assignment #6, Problem 3
Table 3: Series RLC Circuit

The table below is based on calculations with the following formulas:
(show the four formulas above using Microsoft Equation)

R = 6.80E+03
C = 4.00E-07
L = 3.96E-03

f(Hz)	X_C (Ω)	X_L (Ω)	Z (Ω)	p.f. (degrees)
100	3.98E+03	2.49E+00	7.88E+03	-30.32
200				
500				
1000				
2000				
5000				
10000				
20000				
50000				
100000				

Contents/Formulas for first line of calculations:
f: A21 = (show the appropriate formula and cell address)
X_C: B21 = (show the appropriate formula and cell address)
X_L: C21 = (show the appropriate formula and cell address)
Z: D21 = (show the appropriate formula and cell address)
p.f.: E21 = (show the appropriate formula and cell address)

Notes: Since the values of R, L, and C are required in the formulas above, it is best to put "R=" in column A (with right justification) and "6.80 E+03" in column B (with left justification). Then the values of R, L, and C can be accessed by referring to their cell addresses (***absolute addresses***).

4. Work problem 14.5 in the text with the following additional specifications:
   - Also include columns for temperature in Kelvin and degrees Rankin. So the table should a heading like the one shown below:

Temperature (°C)	Temperature (°F)	Temperature (K)	Temperature (°R)
-50			
-40			
.			
.			
150			

   - The equations for temperature conversions are shown below. Display them above the table using Microsoft Equation.

$$T(°F) = \frac{9}{5}\left[T(°C)\right] + 32$$

$$T(K) = T(°C) + 273.15$$

$$T(°R) = T(°F) + 459.67$$

   - Include two digits after the decimal point for temperature in degrees Fahrenheit, Kelvin and degrees Rankin.
   - Include formulas for the first line of calculations under the table.
   - From the tabulated information, when does temperature in ^{o}F equal temperature in ^{o}C? Add shading to the two cells to highlight them.