EGR 120
Introduction to Engineering
File: N120H7M

Due date: _____
(See Due Dates Table)

Homework Assignment #7 (Excel B)

Reading Assignment:

Read Chapter 14 in Engineering Fundamentals – An Introduction to Engineering, 3rd Edition by Moaveni.
Study the PowerPoint presentation – Excel B
Additional examples are available on the instructor's web site (or Blackboard site):

- ***Linear Regression using Microsoft Excel***
- ***Exponential Regression using Microsoft Excel***
- ***Power Regression using Microsoft Excel***
- ***Logarithmic Regression using Microsoft Excel***
- ***Polynomial Regression using Microsoft Excel***

Computer Assignment:

It is preferred that you print the assignment and submit it to the instructor during class. If it is submitted by email, use only one Excel file and use a separate sheet (Sheet1, Sheet2, etc) for each part of the assignment.

General instructions for each part: (also see the examples listed above)

A) For each problem:
- Include your name, the course number and name, and the problem number
- List the filename
- Include instructions (or a summary)

B) For each table:
- Include thick lines on the outside, thin lines on the inside, and a thick line around the heading
- Center each column
- Use the exact same number of digits as are provided with the problem
- Include variables and units in the table headings as provided

C) For each graph:
- Use a title that includes your name and the problem number (e.g., John Doe, Problem 5.1)
- Include variable names and units as axis labels
- Include solid major gridlines and dotted minor gridlines
- Make the graph large enough so that features can be clearly seen
- Remove any shading in the graph area
- Use XY (scatter plots) with no lines and then add a trendline
- All numbers on the axes should be outside of the graph area
- The graph should be inserted into the spreadsheet so that the entire problem (initial information, table, and graph) will fit on a single printed piece of paper unless otherwise instructed
- Show both the trendline equations and the value of R^2. Move them to an area where they are easily readable. Use proper variable names in each equation.
- Use the appropriate scale (linear or log) for each type of trendline as follows:

Type of trendline	x-axis	y-axis
Linear	Linear	Linear
Exponential	Linear	Log
Logarithmic	Log	Linear
Power	Log	Log
polynomial	Linear	Linear

1. Problem 14.28 in Engineering Fundamentals – An Introduction to Engineering, 2nd Edition by Moaveni. Additional specifications:
   - Include graphs with linear and exponential trendlines. Show the equations and the R^2 values on the graphs.
   - Discuss which of the trendlines fits the best and why.
   - Compare the actual and predicted values by adding a column of y regression values calculated using the trendline formula corresponding to the best fit (i.e., include a table with three columns: x, y, and y(regression) to show how closely the y(regression) values match the original y values.)
2. Problem 14.29 in Engineering Fundamentals – An Introduction to Engineering, 2nd Edition by Moaveni. Additional specifications:
   - Include graphs with linear, exponential, and 2nd-order polynomial trendlines. Show the equations and the R^2 values on the graphs.
   - Discuss which of the trendlines fits the best and why.
   - Compare the actual and predicted values by adding a column of y regression values calculated using the trendline formula corresponding to the best fit.
3. Problem 14.23 in Engineering Fundamentals – An Introduction to Engineering, 3rd Edition by Moaveni. Additional specifications:
   - Use increments of 2 mph as velocity varies from 30 to 70.
   - Include at least 3 significant digits in the two columns displaying fuel consumption.
   - Use Microsoft Equation to display the equation for fuel consumption along with the instructions.
   - Include the Excel formula for the first line of calculations below the table.
   - Include a linear graph of fuel consumption (in miles/gallon) versus velocity (show the data points and a smooth line, but no trendline).
   - Include a linear graph of fuel consumption (in gallons/mile) versus velocity (show the data points and a smooth line, but no trendline).
   - At what velocity is the fuel consumption (in miles/gallon) maximum? What is the corresponding value of the fuel consumption?
4. Create a spreadsheet containing the table of information below and form a graph of Weight versus Diameter. Diameter is the independent variable. Determine the **power equation** that represents the data.

Table 1: Weight per foot of wire rope

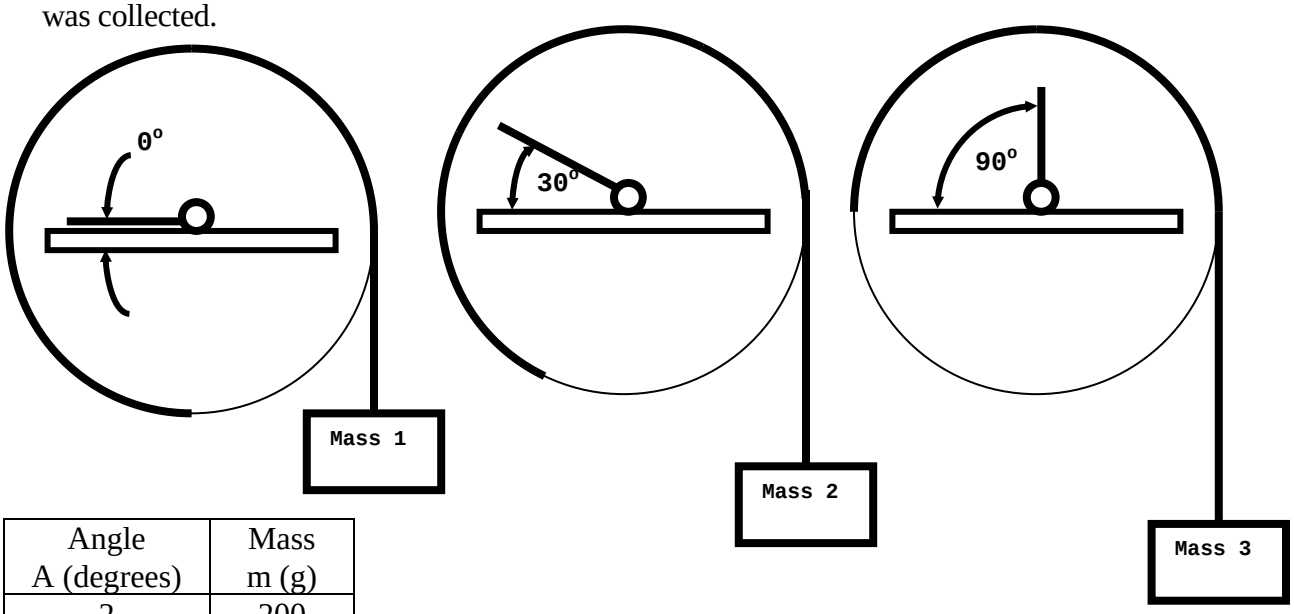
Diameter, D (in)	Weight, W (lbf/ft)
0.75	1.41
1.00	2.50
1.25	3.91
1.50	5.63
1.75	7.66
2.00	10.00
2.25	12.50
2.50	15.2
2.75	18.3
3.00	22.2
3.50	29.9
4.00	38.4

5. Create a spreadsheet containing the table of information below and form a graph of Charge versus Time. Time is the independent variable. Determine the **exponential equation** that represents the data. Note: The scientific notation format shown below is different from what you will see in Excel.

Table 3: Charge versus time for a capacitor

Time, t (s)	Charge, Q (C)
0.0	2.50×10^{-5}
0.1	1.68×10^{-5}
0.2	1.13×10^{-5}
0.3	7.50×10^{-6}
0.4	5.00×10^{-6}
0.5	3.50×10^{-6}
0.6	2.30×10^{-6}
0.7	1.50×10^{-6}
0.8	1.00×10^{-6}
0.9	8.00×10^{-7}

6. A mousetrap was tested by connecting a wheel to the striking arm and then adding different masses to a string wrapped around the wheel as shown in the diagram below. The data in the table shown was collected.



Angle A (degrees)	Mass m (g)
2	200
15	250
25	300
39	350
54	400
70	450
105	500
115	550
128	600
147	650
167	700

- Create a spreadsheet containing the table of information provided. You do not need to include the diagram above.
- Form a graph of Mass versus Angle. Angle is the independent variable.
- Add linear, exponential, and power trend lines to the graph. Show the equation and R^2 for each trend line. Which trend line fits best?
- State the best equation in a box using a Microsoft Equation 3.0.