# EGR 120 Due date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Introduction to Engineering

File: EGR120-Excel-B

**Homework Assignment #9 (EGR120-Excel-B)**

**Reading Assignment:**

Read Chapter 14 in Engineering Fundamentals – An Introduction To Engineering, 5E by Moaveni.

Class Notes - Excel B PowerPoint Presentation

**Computer Assignment:**

* Complete the assignment described below.
* Use only one Excel file to store all parts of the assignments by placing each part on a different sheet (Sheet1, Sheet2, Sheet3, etc – renamed as Problem 1, Problem 2, Problem 3, etc) within the file.
* Submit the single Excel file using Canvas. All Excel assignments will only be accepted via Canvas.
* **Warning**: Your assignments must be your own work. You can ask other students questions, but sharing files is cheating. If any evidence of copied files is discovered, all parties involved will receive grades of 0 and may be subject to further disciplinary action.

**General Instructions for each Problem**: (also see the examples in the Excel B PowerPoint presentation)

A) For each problem:

* Include your name, the course number and name, and the problem number
* Include instructions (or a summary)

1. 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 (if data is given).
* Include variables and units in the table headings as provided

1. For each graph:

* Use a title that includes your name and the problem number (e.g., John Doe, Problem 5.1)
* Include variable names, variable symbols, and units as axis labels if they were provided (e.g, Distance, x (m))
* 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
* Show both the trendline equations and the value of R2. Move them to an area where they are easily readable.
* Replace x,y in the trendline equation with the proper variable names.
* 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 14.15 in the text**. Follow the “General Instructions for each Problem” listed above.

Additional specifications are listed below:

* Note that this is a ***theoretical graph***, not measured data, so be sure to make proper graph selections.
* Use an ***absolute address*** to refer to the value for the density of air (it should be clearly labeled).
* No trendline is required.

1. **Problem 14.30 in the text**. Follow the “General Instructions for each Problem” listed above.

Additional specifications are listed below:

* Include two graphs: one with a linear trendline and one with an exponential trendline. Which fits best? Why?
* An error message may occur if you attempt to add a power trendline or logarithmic trendline. Why?
* Use the trendline equation that fits best to predict the value of y for x = 275, 325, and 400. Put these three results in a separate table. Show a sample Excel formula below the table.

1. **Weight versus diameter for a wire rope (cable)**. Follow the “General Instructions for each Problem” listed above.
2. 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.
3. Use the trendline equation found above in an Excel formula to calculate the predicted weight for diameters of 1.40, 5.00, and 10.00 inches. Put these three results in a separate table. Show a sample Excel formula below the table. (Answer to check your results: ***W = 237.2 lbf/ft for D = 10 in***).

Table 3: 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 |

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1. **Charge versus time for a capacitor.** Follow the “General Instructions for each Problem” listed above.
2. 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.
3. Use the trendline equation found above in an Excel formula to calculate the predicted charge for times of 0.75, 1.00, and 1.50 seconds. Put these three results in a separate table. Show a sample Excel formula below the table. (Answer to check your results: ***W = 5.57E-8 C for t = 1.50 s***)

Table 4: Charge versus time for a capacitor

|  |  |  |
| --- | --- | --- |
| Time, t (s) | Charge, Q (C) |  |
| 0.0 | 2.50 x 10-5 | Hint: Recall how numbers in scientific notation |
| 0.1 | 1.68 x 10-5 | are entered in Excel. (They will not appear |
| 0.2 | 1.13 x 10-5 | as shown in this table.) |
| 0.3 | 7.50 x 10-6 |  |
| 0.4 | 5.00 x 10-6 |  |
| 0.5 | 3.50 x 10-6 |  |
| 0.6 | 2.30 x 10-6 |  |
| 0.7 | 1.50 x 10-6 |  |
| 0.8 | 1.00 x 10-6 |  |
| 0.9 | 8.00 x 10-7 |  |

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1. **Mass versus Angle for a mousetrap**. Follow the “General Instructions for each Problem” listed above.

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.

1. Create a spreadsheet containing the table of information provided. You do not need to include the diagram.
2. Form a graph of Mass versus Angle. Angle is the independent variable.
3. Add linear, exponential, and power trendlines to the ***same graph***. Show the equation and R2 for each trend line. Which trendline fits best? Use linear/log scales to match the best fit trendline. Use the appropriate linear/log scales based on the trendline that you choose.
4. Display the best equation.
5. Use the trendline equation found above in an Excel formula to calculate the predicted mass for angles 30, 90, 120, and 180 degrees. Put these four results in a separate table. Show a sample Excel formula below the table. (Answer to check your results: ***Mass = 745 g for Angle =180 degrees***)

**Mass 1**

**Mass 2**

**Mass 3**

**0o**

**30o**

**90o**

Table 5: Mass versus Angle for a Mousetrap

|  |  |
| --- | --- |
| 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 |