ENGR 0011 – Fall 2018
HW 4

Acceptable behaviors for this assignment include:	Unacceptable behaviors for this assignment include:
• Consulting your textbook or other written material • Asking your team members • Asking your professor or TA Note that consulting materials and asking others is only acceptable as long as they do not provide you with the solutions – you have to come to the solution on your own!	• Copying the solution(s) from a solution manual, book, or other written material • Copying the solutions(s) from assignments submitted in previous semesters • Providing the solutions to a classmate, student in other section, student in future section, or online solution banks • Asking someone to complete the assignment for you

Problem 1

Part a.

Given below is a table containing four sets of experimental data. Enter these data into an Excel spreadsheet and then prepare individual plots of each set of data (vs. the original x data) on separate sheets in your workbook. Be sure to give each plot a title, x and y axis labels and a legend. Use the x-y scatter plot option without connecting the points.

Examine the plots and decide which fit is appropriate:

- Linear $y=ax+b$ (relationship appears linear when plotted using both a normal x and normal y scale)
- Exponential $y=ae^{bx}$ (relationship appears linear when the y data are plotted on a log scale)
- Power $y=ax^b$ (relationship appears linear when both the x and y data are plotted on a log scale)
- If none of the above appear as a best fit, use a polynomial to fit the data.

Assume the data is experimental and will not fit any relationship exactly. Once you think you have identified the appropriate relationship for a given set of data, use the trendline feature in Excel to add the trendline for the best fit. Select the appropriate options and be sure to display both the equation and r-squared value. Remember that both the exponential and power relationships require that data values of less than or equal to zero be filtered because the log of a nonpositive number is undefined. These data may need to be removed (filtered) from your analysis.

If the data are best fit with an exponential relationship (semi log), then also plot the natural log of y versus x. That is, you should create another column of data (ln y) and have two plots. Add the linear trendline displaying the equation and rsquared values to the second plot.

If the data are best fit with a power relationship (log log), then also plot the natural log of y versus the natural log of x. That is, you should create two additional columns of data (ln x and ln y) and have two plots. Add the linear trendline displaying the equation and r-squared values to the second plot.

Part b.

If the data is fit with either a linear, exponential, or power relationship then add columns to your sheets to show the calculation of the r-squared value. You should get the same value as displayed from the Excel trendline function. Remember if you have an exponential (semi log) relationship then you must use the ln(y) in your computations and if you have a power (log log) relationship then you must use the ln(x) and the ln(y) in your computations.

Also, create a text file in which you write a short paragraph about whether you think your trendline is an appropriate representation of the data and any ideas you may have on improving your analysis.

x	Data Set 1	Data Set 2	Data Set 3	Data Set 4
0.00	2.00	0.00	-8.00	58.00
0.50	1.60	0.90	1.00	55.00
1.00	1.50	3.00	-6.00	45.00
1.50	0.90	6.00	-1.00	30.00
2.00	0.70	10.40	1.00	10.00
3.00	0.40	20.00	2.10	-41.00
4.00	0.27	40.00	3.90	-102.00
5.00	0.18	55.00	6.00	-167.00
6.00	0.10	65.00	8.00	-230.00
7.00	0.00	100.00	10.00	-285.00
8.00	0.04	120.00	12.00	-326.00
9.00	0.02	160.00	14.00	-347.00
10.00	0.00	190.00	16.00	-342.00

Problem 2

On a new sheet in your workbook…

A manufacturer of mp3 players is preparing to set the price on a new model. Demand (D) is thought to depend on the price (P) and is represented by the model:

$$D = 2000 - 3P$$

The accounting department estimates that the total costs (C) can be represented by

$$C = 5000 + 4D$$

Develop a model for the total profits (Revenues minus Costs) and represent it on an Excel spreadsheet. Use a table and a graph with $ on the y axis and Demand on the x axis to find the price at which profit is maximized.

Problem 3

Do problem 5 on page E-174 and E-175 of the text. Write the solution in text file created for Problem 1 Part b.

This is a team assignment. You need to submit an Excel file with a separate worksheet for each data set in Problem 1 and a separate worksheet for Problem 2. You will also turn in a text file with the analysis for the trendlines as well as your answers to problem 3 (problem 5 from the text).

You need to submit this assignment in a zipped folder. To do this, follow these steps: (1) Put your Excel file and text file in a folder, (2) Right click on the folder, go to "Send to", then "Compressed (zipped) folder" (see Image 1), (3) Name your zipped folder Assign-4-TeamName (e.g. Assign-4-L03; see Image 2).

Upload the zipped folder through your class computer using the official file submission link (found on the desktop of class computers in GSCC 138 or BEH 229 at the beginning of the class when this assignment is due).

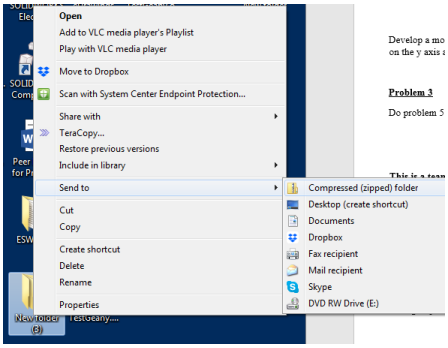

Image 1

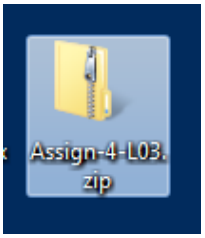

Image 2