

## Homework #7 Engineering 0711 - Fall 2009

**Due:** Monday, October 5

Your task is to write a MATLAB script that will plot a set of data and fit a curve to the data. The script should:

### Part 1

1. Have a section that allows the user to enter the name of a data file.
2. Be capable of reading data stored in either rows or columns.
3. Allow the user to select the color and type of plot symbol.
4. Once the data is entered, it should plot the x - y data.
5. Enter a pause in the program so the user can view the output of the plot, then fit the data with a linear line. Do not use the polyfit command to find the coefficients of the equation. Instead use linear algebra to solve the equations for the best fit shown in the text book.
6. Allow the user to select the color of the line, and plot the x - y data and best fit line on the same graph.
7. Calculate the absolute error and relative error. Have the script display the maximum value of both errors and the x coordinate corresponding to each maximum error. (Be careful with dividing by zero. What do you do????)
8. Calculate the r-squared value.
9. Add the equation of the line and the r-squared value to the graph (for now enter the words r-squared, we will show you how to enter  $r^2$  later).
10. Have a section that will allow the user to enter the plot title, and x and y axis labels.
11. Allow the user to estimate the value of the best fit for any x coordinate.
12. Once the user is satisfied with the results, the script should allow the user to enter a new set of data without ending the program. Do not use a menu for this. Make sure the script allows for user input error (ie. Check for words versus characters and for incorrect characters)
13. Once you have completed this, enter the same data sets into Excel and fit a trend line to the data. Do you get the same equations and r-squared value? What software would you use it given this task to do for another class?

### Part 2

14. Once the script is complete, modify it so the user has the option to fit a linear line or a polynomial. Use an if statement to select the choice.
15. For the polynomial fit use polyfit, the program should use at least 300 data points to plot the curve and the program should be capable of starting the curve at the smallest and largest x coordinate without user input.
16. Once the polynomial is fit to the data the program should allow the user to try different degree fits to the data. Make sure you check for the maximum degree.
17. Add the equation to the plot, along with titles and labels. Note, adding the equation to the plot requires you to build a string array.

**Procedure:** Given below is a table containing two sets of data. Enter these data into two separate data files. Data set 1 should be entered as rows and named rowdata.dat. Data set 2 should be entered as columns and named coldata.dat. Then prepare individual plots of these data with the best fit curves and save the plots as figure1.fig and figure2.fig. Be sure to give each plot a title, x & y-axis labels and a legend.

	data	
x	set1	set2
0	1.4	-10.0
0.5	1.3	-5.0
1.0	1.1	3.0
1.5	0.9	6.0
2.0	0.7	10.4
3.0	0.4	20
4.0	0.27	40
5.0	0.18	55
6.0	0.1	95

7.0	0.0	100
8.0	-0.2	120
9.0	-0.3	160
10	-0.4	190

**Deliverable:**

Each group should turn in a folder with the data sets, the plots, the Matlab script and an Excel file.

Note: Your script must have a header section in comments that identifies:

Team members

Engineering 0012 M, W. 00:00-00:00

Instructor:

Date:

Assignment number (i.e., Homework 7)

Statement of the purpose of script

Throughout the script use comments to define the purpose of every variable.

Also, you will be graded on programming style. Use whitespace, comments, indenting, etc.

**Hint:**

This is going to be a very long program. Layout the logic before you start, and built the program in sections. Do you have existing programs that you can reuse? Make sure each section works before you go onto the next step. If you design your script by following the numbered list above you might find it helpful. Have fun!!!