Due November 13

1. Let $f(x) = 4x^4 - 6x^3 - 2x^2$ and $g(x) = x^2 + 4x + 2$. Using MATLAB's polynomial commands, perform the following tasks. NOTE: you shouldn't need to use pencil and paper for these answers, just MATLAB.

   (a) Plot $f(x)$, find the roots (to 4 decimal places) and illustrate them on the graph with markers. If there are multiple roots, specify which are on paper.

   (b) Plot f, g, $4f$, $-3g$ and $4f - 3g$ on the same graph.

   (c) Find $(fg)'$.

   (d) Calculate $\dfrac{f(x)}{g(x)}$ and $\dfrac{d}{dx}\left(\dfrac{f(x)}{g(x)}\right)$.

2. Let $f(x) = 3x^4 - 16x^3 + 18x^2$. Using MATLAB commands along with calculus knowledge,

   (a) find the location of local maxima and minima (if any)

   (b) find the location of any inflection points (if any)

   (c) find the location of the x-intercepts as well

   (d) plot the function that shows all of the above clearly. Mark the points on the graph with clear markers.

   State your answers that MATLAB gives you to a-c on paper as points with the coordinates of the points being accurate to 4 decimal places and specifying what points are what.

3. The following data points are given. The data are also stored in the file
   `Assign8_3.MAT` on the H-drive.

x	-5	-4	-2.2	-1	0	1	2.2	4	5	6	7
y	0.1	0.2	0.8	2.6	3.9	5.4	3.6	2.2	3.3	6.7	8.9

   (a) Fit the data using polynomials of degree 1, 3, 4 and n, where n is the degree necessary to fit all data points (you figure it out!). State the polynomials of those degrees as $p_1(x)$, $p_3(x)$, etc. using at least 3 significant digits to the coefficients.

   (b) Make 4 plots (using `subplot`) that shows each polynomial along with the data points in one figure. Each subplot should be labeled appropriately.

To turn in:

- Script files of how you obtained your answers. The output should be formatted such that if the script file was run, you know what answers are to what, etc. You should have just 3 of these script files, one for #1, one for #2 and one for #3. Name these files `assign8_1.m`, etc.

- Script files of how you obtained your plots (saved as JPGs). Name them `assign8_1a.m, assign8_1b.m, assign8_2d.m`, etc.

- Your answers on paper. Interpret what MATLAB gives you as an answer into a polynomial or point, etc.

Your script files and JPG files should be emailed with the subject line "MATLAB HW8".