EE202 Lab#5

Lab Format:

i.   Summarize the question, delimited by a row of stars (****)

ii.   Write the Matlab code from your M-file, diary, or command window. Be sure to suppress the output of intermediate values using the semicolon (;).

iii. Paste into Word your plot. This can be done in two ways. (1) Save your graph in a format than can be imported into Word (e.g., bmp, jpeg) and then Insert-Picture, or (2) to save time in Matlab you can simple Select Edit => Copy Figure in the window displaying the Figure and then paste (CTRL-V) directly into Word.

iv.   Any additional output that may be requested.

1. Enter the x, y dataset given on page 87 (Section 8.1.1)
(a) Create the 2D plot shown on the right in Figure 8.1. Specifically, a black dotted line with diamond markers.

sert each picture after the m-file of command line(s) that generated it.

(b) Write a Matlab expression to create a 1x7 vector of random numbers (`rand` or `randi`, not *randint*) between 1.0 and 10.0. Assign the output to variable c. For example:
```
4.3000    2.0000    8.0000    4.5000    3.2000    4.6000    1.9000
```
Next, write a Matlab expression to create a 1x7 vector of sorted (`sort`) random numbers between 1.0 and 10.0. Assign the output to variable b. For example:
```
1.4000    4.0000    5.4000    5.4000    9.1000    9.1000    9.5000.
```
Plot your x,y and b,c graphs on the same figure as presented on page 88.

```
plot(x,y,'g--',b,c,'r--')
```

2. Entering "Matlab spline" in Google and clicking on the first link will take you to http://www.mathworks.com/help/matlab/ref/spline.html Generate the sine curve described in Example 1.

3. In this exercise you are going to recreate many of the plots found in the http://www.csun.edu/~ms4288/documents/chemistry.pdf file. *To save you time I have saved the data in the* `periodicTable.m` *file found in the Lab 5 folder.*

(a) [8.1.1 to 8.1.3] Applying what you learned in Section 8.1.1 "Basic Plots" to Section 8.1.3 "Multiple Plots in a Figure"; use the subplot function to graph the Boiling Point, Melting Point, Atomic Mass, and Ionization Energy as a function of Atomic Number as shown in the reference pdf file. Specifically, place the "Boiling Point vs. Atomic Number" plot in the upper right hand corner, "Melting Point vs. Atomic Number" in the upper left hand corner, "Atomic Mass vs. Atomic Number" in the lower left hand corner, and Ionization Energy vs. Atomic Number" in the lower right hand corner. All four plots must be contained in the same figure. Although you must

show the Diamonds and Square markers as shown in the example, you are not required to show the atomic number (adding them is not difficult simply time consuming). Do not replicate the cropping errors in the pdf file (i.e., complete the plots for all 20 elements).

(b) Recreate the pretty blue plot of the Melting Point as a function of Atomic Number on page 3 of the reference document. Do not replicate the cropping or x-axis labeling errors in the pdf file. Here is the closest I could come to this Figure.
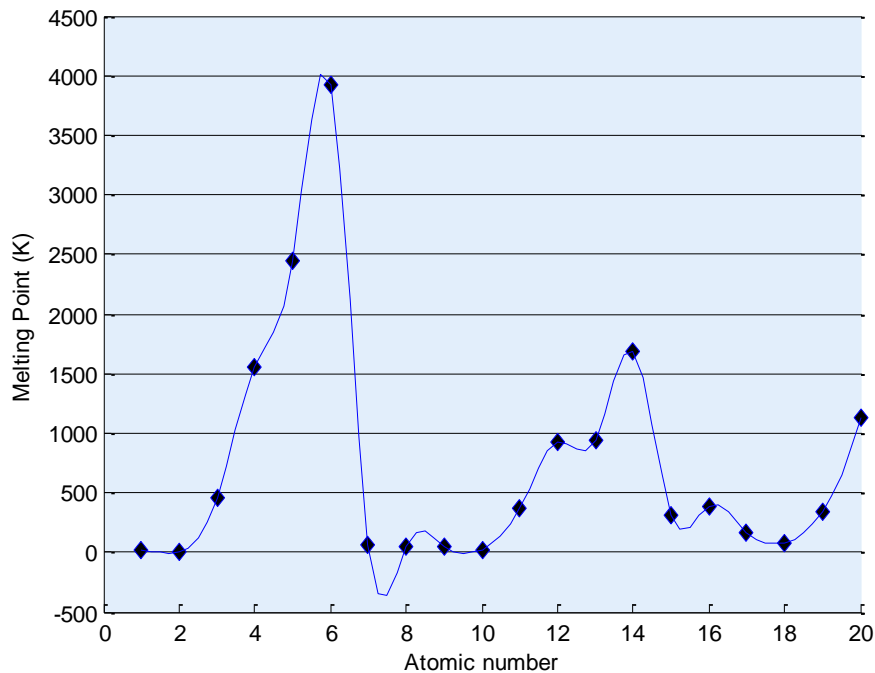
Although it does not appear so, this is actually two graphs on the same figure. The data set is smoothed using a spline function, overlaid with the data set plotted as discrete diamonds. Because of the color requirements of this question, I will be signing off on this exercise.

4. The average 18-year-old American male weighs 152 pounds. A group of 100 young men were weighed and the data stored in a file called weight.dat.

(a) Download the weight.dat file to your Matlab working directory. This is an ASCII data file with weight data space delimitated. Create an M-file. Load the data file into a row vector named weight.

(b) Create the line plot of weight data. This will be the first of two plots contained in the same figure (`subplot`). Title the plot 'Weight of Freshman Class Men.' Label the x-axis 'Student Number' and the y-axis 'Weight, lbs'. Finally apply a grid to your plot. Place the following comment at the beginning of your code.
```
% Create the line plot of weight data
```

(c) Next, create the histogram of the data. This will be the second of the two plots contained in the figure (`subplot`). Title the plot 'Weight of Freshman Class Men.' Label the x-axis 'Weight of students' and the y-axis 'Number of students.' Place the following comment at the beginning of the section of your code.

```
% Create the histogram of the data
```
(d) Calculate and display the following summary data:
```
average_weight
standard_deviation
maximum_weight
minimum_weight
```
Place the following comment at the beginning of the section of your code.
```
% Find the average and standard deviation
```
(e) Discuss if the graph and summary data matched our expectations as mentioned at the beginning of the assignment and from a statistical point of view.
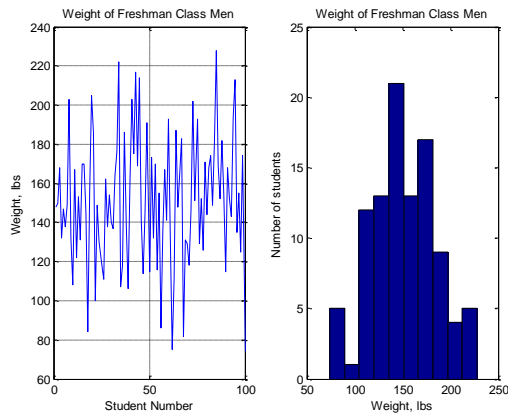

```
average_weight = …
standard_deviation = …
maximum_weight = …
minimum_weight = …
```

5. [8.1.3] According to Moore's law (an observation made in 1965 by Gordon Moore, a cofounder of the Intel Corporation) the number of transistors that would fit per square inch on a semiconductor integrated circuit doubles approximately every 2 years. Although Moor's law is often reported as predicting doubling every 18 months, this is incorrect. A colleague of Moore took into account the fact that transistor performance is also improving, and when combined with the increased number of transistors results in doubling of performance every 18 months. The year 2005 was the 40th anniversary of the law. Over the last 40 years, Moore's projection has been consistently met. In 1965, the then state-of-the-art technology allowed for 30 transistors per square inch. Moore's law says that density can be predicted by $d(t) = 39\left(2^{\frac{t}{2}}\right)$, where t is measured in years.

Letting t = 0 represent the year 1965 and t = 47 represent 2012, use this model to calculate the predicted number of transistors per square inch for the 47 years from 1965 to 2012. Let t increase in increments of 1 year (`t=0:47`). Using the subplot feature, plot the data in a linear x-y plot, a semilog x plot, a semilog y plot, and a log-log plot. Be sure to title the plots and label the axes as shown below.