BME 790.01: Engineering Programming and Signal Processing
Fall 2013
Worksheet 3

Instructions: Program the following in MATLAB working independently or with a partner. Be sure to save your .m file as well as your plots saved to a .pdf and uploaded to the DropBox on Sakai. Clearly label your submission as Worksheet3_yourname.

1. As you know, MATLAB is entirely discreet. Let's assume $x(t) = e^{-(t-7)}$ for the purposes of this worksheet. Initialize a reasonble t with a reasonable step size. Plot x(t) verses t in red.
2. Plot x(t+1) verses t on the same graph in black.
3. Now create the specific delta function we used in class, $\delta(4-t)$ and plot it in blue on top of the previous graph.
4. Now use MATLAB to perform the math in the first class example, i.e $x(t+1)\delta(4-t)$. Plot the result on a new figure and explore the subplot command. Create a figure with plots in 3 rows x 1 column. Plot the first example in the first row.
5. Using MATLAB, calculate the second example from class, i.e. $\int_{-\infty}^{\infty} x(\tau+1)\delta(4-\tau)d\tau$ and plot it on the second row plot for your previously determined time vector t.
6. Using MATLAB again, calculate the third class example, $\int_{-\infty}^{t} x(\tau+1)\delta(4-\tau)d\tau$ and plot it as a function of time on the third row plot.
7. Were the answers the same as your hand calculated values? What factors could affect the accuracy of the MATLAB result?
8. Let's see if we can play with matrices now. Create a matrix of zeroes 256x256. Make a 51x51 pixel square of ones right in the center of the 256x256 matrix. Create another figure with two subplots (1 column, 2 rows). For the first column and row use one of the MATLAB visualization tools to image the matrix (imagesc, image, imshow). Make sure to make the appropriate settings so the image is black and white and the pixel sizes are equivalent.
9. On the second subplot, plot the central line of the above image. Save it as a .pdf and turn it in with the other figures.