

## Homework Assignment 1

Biomedical Signal and Image Processing, Spring, 2010  
4800-420:001, 4800-697:002

Due January 20

### Curve sketching using Matlab.

1. Signal  $x_1(t) = \sin(2\pi(0.3t))$ . Sample this on the interval  $0 \leq t \leq 5$  with spacing  $\Delta t = 0.01$ . Compute the Fourier transform of the resulting signal and plot the absolute value of the transform. Describe what happens if the Fourier transform (and not its absolute value) is plotted. Also, why do you think that the Fourier transform has the shape that it does?
2. Assume another signal is  $x_2(t) = \sin(2\pi(1.45t))$ . Sample this signal on the same interval as in question 1, and with the same sampling rate. Using Matlab's *subplot* command, plot  $x_2$  in the top graph (2,1,1) and plot the magnitude of its Fourier transform in the bottom graph (2,1,2). Add a title to at least one of the subplots.
3. Plot the digitized versions of both  $x_1$  and  $x_2$  in the same graph. Make one of them a different color plot than the other.

Next, plot the absolute value of the Fourier transform of each of them in a common plot, making one of the plots a different color than the other. Thicken the size of the curves in each case, over the default value. Add a "legend" to the common plot. Insert a text box for each of the two curves. Put a description of which transform is represented in the wording of the text box. For each text box, add an arrow pointing to the appropriate curve to the common plot.