Program Assignment # 4, EE5350

1. Make up your own desired amplitude response $|H_d(e^{jw})|$ for a causal lowpass digital filter, and write a function that specifies this response. Make the response interesting, so that the magnitude is not flat within the passband.

2. Make up your own phase response as well. An example is:

$$\phi_d(w) = -64 \cdot w + \frac{2\pi}{6} \sin(2w)$$

which has an approximate time delay of 64 samples. Using $|H_d(e^{jw})|$ and your desired phase response, design a causal FIR digital filter $h(n)$ using the inverse DFT or FFT with $N_h = 129$ coefficients.

3. Using CONV from program assignment 2, apply the filter $h(n)$, of part 2 to the input signal

$$x(n) = \cos(C \cdot n^2) \text{ where } C = .009$$

where $N_x=220$. Calculate amplitude responses for $x(n)$, $h(n)$, and $y(n)$, using your AMP function from program assignment 3.

4. Turn in your source code, plots of the amplitude spectra from part 3, and plots of $x(n)$ and $y(n)$. Plot $|H_d(e^{jw})|$ and $|H(e^{jw})|$ on the same plot for comparison.