Atilim University
EE306 Digital Signal Processing Laboratory

Experiment-4

Window Types

 1. Generate Hamming, rectangular and Blackman windows of length M = 40, using Matlab's built-in functions.
 Then plot their magnitude spectra and compare them.

Use: "hamming.m", "rectwin.m" and "blackman.m"

Windowing

 2. Generate the sinusoidal signal given below.

$$x[n] = 2*\cos(2\pi*n*0.240)*\cos(2\pi*n*0.006) \quad , \quad (0 \leq n \leq 255)$$

 3. Draw this signal in the time domain.
    Then, obtain and plot its magnitude spectrum.

 4. Now window the sinusoidal signal with these windows that you generated in step **"1."** above.
    Don't forget that: the filter and the signal's lengths must be the same.

 5. Compute and compare the magnitude spectra of the windowed signals.

 6. This time take M = 80 and repeat step "**5.**"

Filter Types
 7. Generate a Chebyshev type-1 digital filter of order 6, with 3 dB passband ripple and cutoff frequency = 0.4. Use the command: "cheby1.m". Plot its magnitude spectrum.

 8. Now generate a Butterworth digital filter with the same spec's with step "**7.**". Again obtain and plot its magnitude spectrum. Use "butter.m".

 9. Compare the magnitude spectra that you obtained.
 What kind of filters are these?
 Is their impulse response FIR or IIR?

 10. Now design an FIR highpass filter with the command "fir1.m". Generate a square wave of frequency 100 Hz and filter it with your highpass filter to make it more treble.
 You decide on the filter order and the cutoff frequency.