The Prelab

1. Find the impulse response, $h[n]$, of the following lowpass filter,

$$H(e^{jw}) = \begin{cases} 1 & |\omega| \leq \omega_c \\ 0 & \omega_c < |\omega| \leq \pi \end{cases}$$

where $\omega_c = \pi/4$.

2. $h[n]$ has infinite number of terms. In order to implement the filter you will need to limit the number of terms used. Write a MATLAB code to generate 101 terms of $h[n]$ for n = -50,…,50, and plot of the truncated impulse response.

3. Store the 101 terms in a text file with the following format:

```
//========== fir.cof =========
// This file is used in the FIR lab
// Created by Hector Erives 8/2008

 #define N 101

float h[N]={
      0.0063661977,
      0.0045934506,
            .  .  .
};
```

   This will be a header file which you will include in your program and compile in the main program.

4. Plot the magnitude of $H(e^{jw})$ vs. f

5. Change the number of taps and comment on the change in the magnitude of the response of $H(e^{jw})$.

6. Up to this point you have used a rectangular. Now, instead of using a rectangular window use a Hamming window. Use a stem plot to plot the new coefficients. Figure 1 shows filter responses with the two windows, and a sampling frequency of F_T= 8 kHz.