**ECE 1000 Programming Assignment #3 Spring 2014**

**Objective**

An electronic filter is a device that attenuates frequencies beyond or below a cut-off frequency. A low-pass filter is an electronic filter that allows low frequency components to pass through while filtering out frequency components higher than the cut-off frequency.

1. a. Write a function to create a wedge wave containing multiple frequencies (at least 5) between 200 Hz and 6000 Hz.

b. Write a function to design a 2nd order Low Pass Filter (LPF) to filter out all frequencies above 2000 Hz.

c. Write a function to design a 2nd order High Pass Filter (HPF) to filter out all frequencies below 2500 Hz.

d. Write a function to plot the first 150 points of the original wedge wave and both the filtered waves on the same graph.

**Hints:**

* To design a filter you will need two Matlab functions: ***butter*** and ***filter***.
* The sampling rate = 20,000
* <http://www.mathworks.com/help/signal/ref/butter.html>​

1. The sound recorded using the theremin kit contains many different frequencies. Use the filters that you designed to filter out frequencies above 200 Hz and below 200 Hz. Plot the first 150 points of the original wave and the filtered waves on the same graph.
2. Solve Problems 1-6 from Chapter 5.