MEEM5700 Laboratory Assignment #5 Fall 2013

THIS IS AN INDIVIDUAL ASSIGNMENT.

NO GROUP WORK WILL BE TOLERATED!

Purpose:

The purpose of this lab is to become familiar with digital filters in Matlab and understand how to create and apply different types of digital filters

Tasks:

- For each of the four signals in the file "assignment_5_signals.mat" on CANVAS:
    1. Determine the frequency components of each signal.
        a. Discuss how you determined the frequency content, include DSP parameters used.
        b. Provide any figures you feel necessary.
    2. Digitally filter the data and separate each individual waveform from the signal. For instance, if you were to have a sine wave and a square wave, you should process the data to obtain a time history of just the sine wave and a time history of just the square wave.
        a. When working with a signal with harmonics include at least the first 5 harmonics worth of information.
        b. Plot the frequency spectrums and the time domain components of the filtered and unfiltered signals.
        c. Describe any information regarding the type of filter required to successfully complete this step.

CHALLENGE: 3 extra credit points will be given on the midterm to the individual that can successfully complete the above objectives with the lowest **summation** of filter coefficients used for all parts of the assignment. These 3 points will only be granted to the person who achieves the goals of this assignment on the first try with the lowest total number of coefficients.

HINT: It may be useful for you to think about what these signals are when trying to understand what frequencies go with each other ….all of the components of these signals were generated using simple Matlab commands. All signals in the time traces are made up of simple waveforms which have harmonic content.

NOTE: GIVEN HOW LATE IN THE TERM THIS ASSIGNMENT IS DUE IT IS EXPECTED THAT WHILE YOU WILL HAVE AN OPPORTUNITY TO RE-DO IT, YOU WILL NOT HAVE MUCH TIME TO RE-DO IT. ALL RE-DO'S ARE DUE THE LAST WEEK OF CLASSES TO ALLOW FOR GRADING! DO A GOOD JOB THE FIRST TIME ON THIS ASSIGNMENT.

Deliverables:

Submit a report describing how you completed each of the filtering tasks including the filter characteristics of each filter used using the template from previous assignments that describes the work you have completed.

This lab assignment is to be completed by Thursday, November 21 9:25am and submitted through CANVAS electronically.