

Homework #6: Chapter 7 (due Fri. Oct. 26, 2012)

Preliminary

- All problems are worth +10 points unless otherwise noted.
- Download the CompanionFiles6.zip file
<http://www.ece.nmsu.edu/~pdeleon/Teaching/EE395/Homework/CompanionFiles6.zip>
Download, build (make), run, and verify the companion C codes for DSP
These codes read, write samples from, to input.txt, output.txt files, respectively. In Chapter 8, we will utilize the PortAudio API to read and write samples to the sound card.
- Please attach at the *end* of your assignment printouts of each **process_signal.c** and **initialize_program.c**, as well as other functions written to implement this assignment.
- As a reminder, Exam #2 is Wed. Oct. 31, 2012. The examination will consist of an in-class portion from 10:30-11:20am and a take-home portion which will be given out before the in-class exam. The take-home portion is due on or before 10:30am Fri. Nov. 2, 2012 in Prof. De Leon's office.
- There will be no class on Fri. Nov. 2, 2012.

Software Problems

Use your software tools (C and MATLAB) to solve the following problems.

1. Let the FIR filter coefficients be given by $\mathbf{h} = [0.2 \ 0.2 \ 0.2 \ 0.2 \ 0.2]^T$.
 - a Use your MATLAB tools to filter a unit-pulse signal $\mathbf{x} = [1.0 \ \underbrace{0.0 \ \dots \ 0.0}_{19}]^T$ and list the output samples, i.e. impulse response.
 - b Repeat (a) but use the C implementation and unit-pulse signals for each channel. Filter only the right channel and pass the left channel unfiltered. List interleaved R/L output (use 6 digits of precision).
 - c Compare resulting outputs from **a** and **b** and verify equal values.
2. Let the IIR filter coefficients be given by $\mathbf{b} = [0.1667 \ 0.5000 \ 0.5000 \ 0.1667]^T$ and $\mathbf{a} = [1.0000 \ 0.0000 \ 0.3333 \ 0.0000]^T$.
 - a Use your MATLAB tools to filter a unit-pulse signal $\mathbf{x} = [1.0 \ \underbrace{0.0 \ \dots \ 0.0}_{19}]^T$ and list the output samples, i.e. impulse response.
 - b Repeat (a) but use the C implementation and unit-pulse signals for each channel. Filter only the right channel and pass the left channel unfiltered. List interleaved R/L output (use 6 digits of precision).
 - c Compare resulting outputs from **a** and **b** and verify equal values.

Textbook Problems

7.1, 7.3, 7.5