EEE5502 Foundations of Digital Signal Processing Code 6

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Question #1:

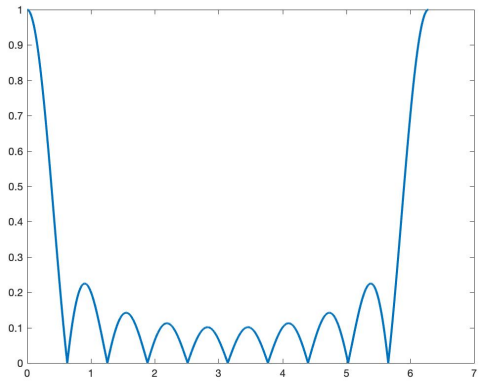
I spent 10 hours.

Question #2:

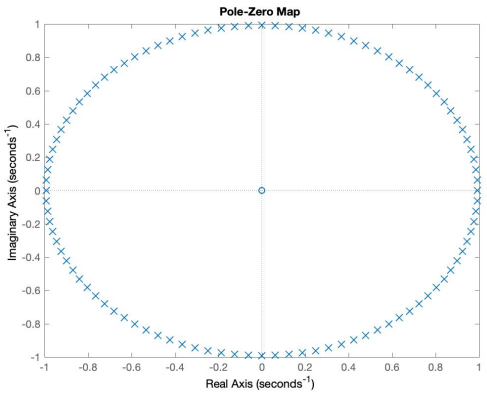
(a) System 1 would cutoff the input signals if the magnitude of the input signal is smaller than 20(outputs 0), would output the original when the magnitude is greater than 20.

(b) System 2 is a low pass filter.

(c) The behavior of system 2 is shown in the approximate DTFT in the plot below, and it proves that system 2 is a low pass filter.



(d) The ploe-zero plot of system 3 is shown below:

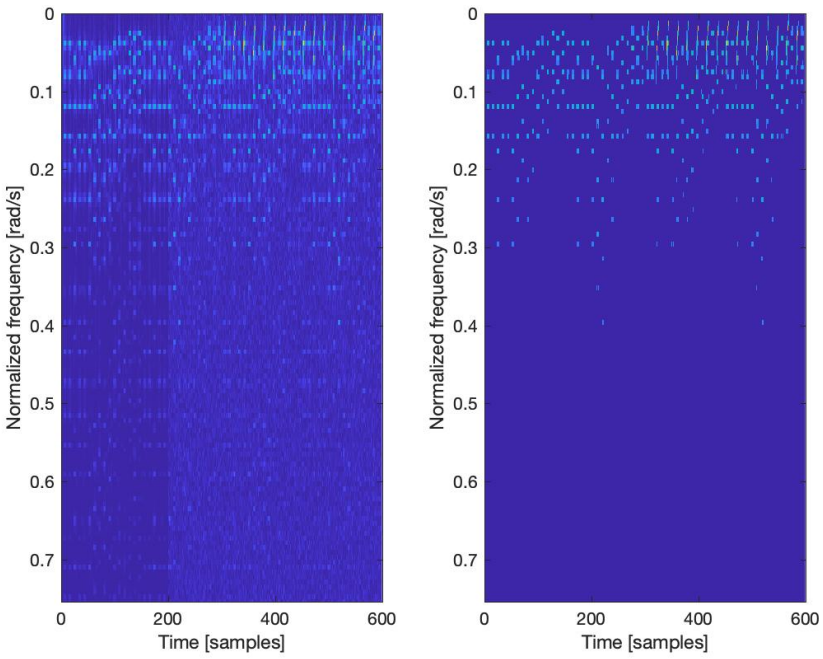


(e) System 3 is an all pass filter.

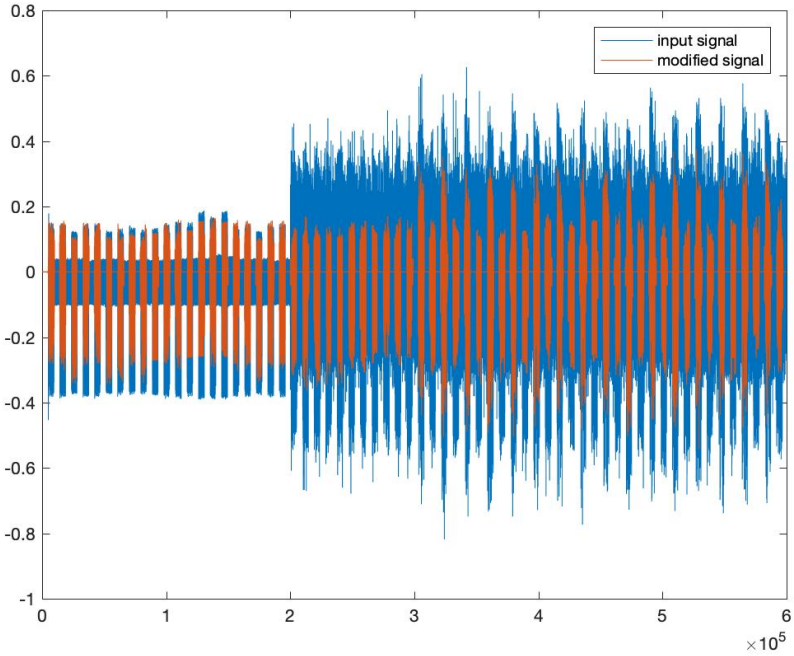
(f) System 3 would pass all the input signal.

Question #3:

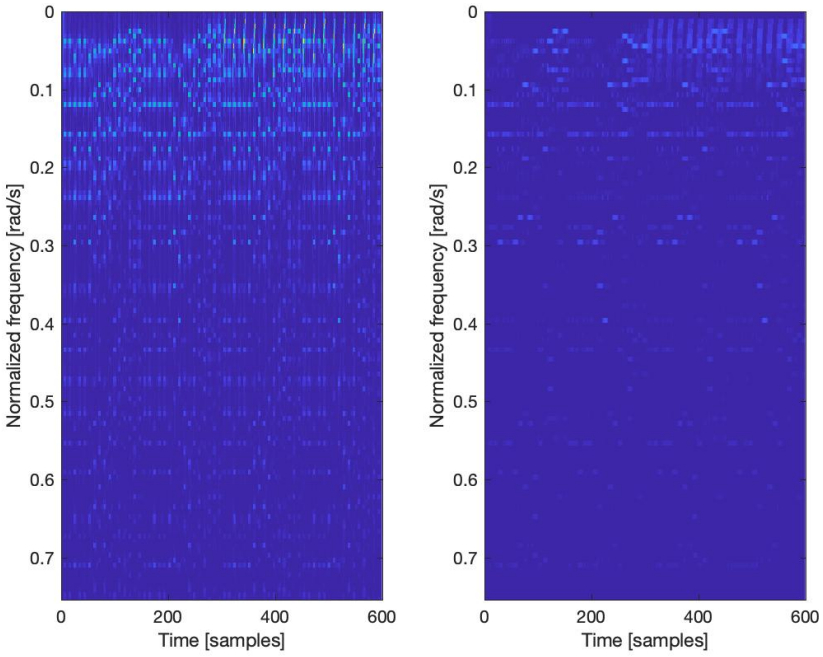
(a) The STFT of the original signal "chiptune_noise" after system 1 applied across the frequency domain is shown below:



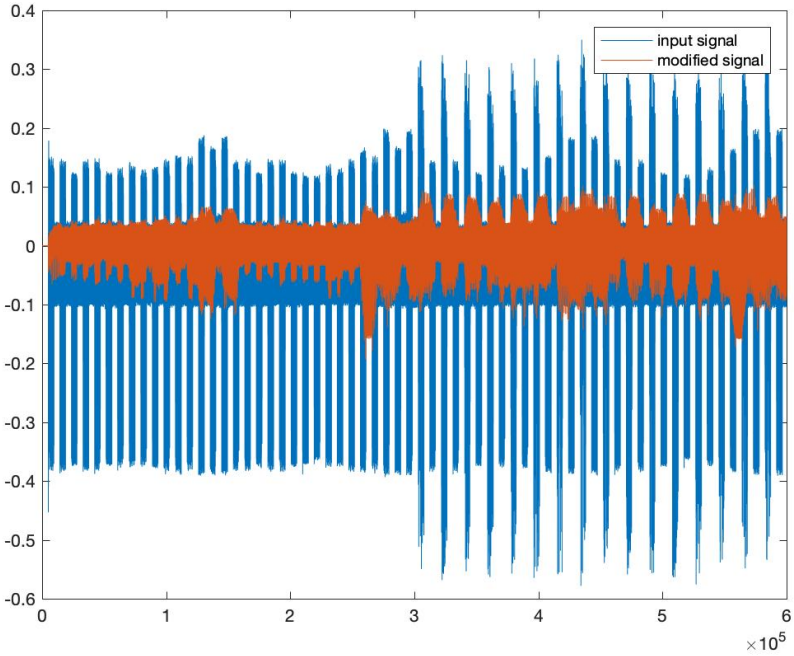
The original audio signal and the modified signal is shown below in the same figure:



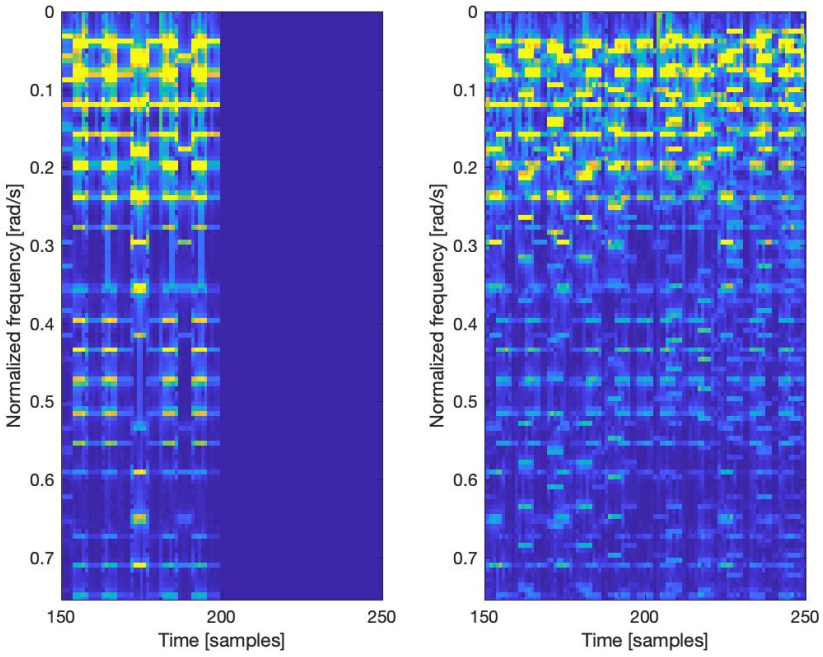
(b) The STFT of the original signal "chiptune_normal" after system 2 applied over the time domain of the STFT is shown below:



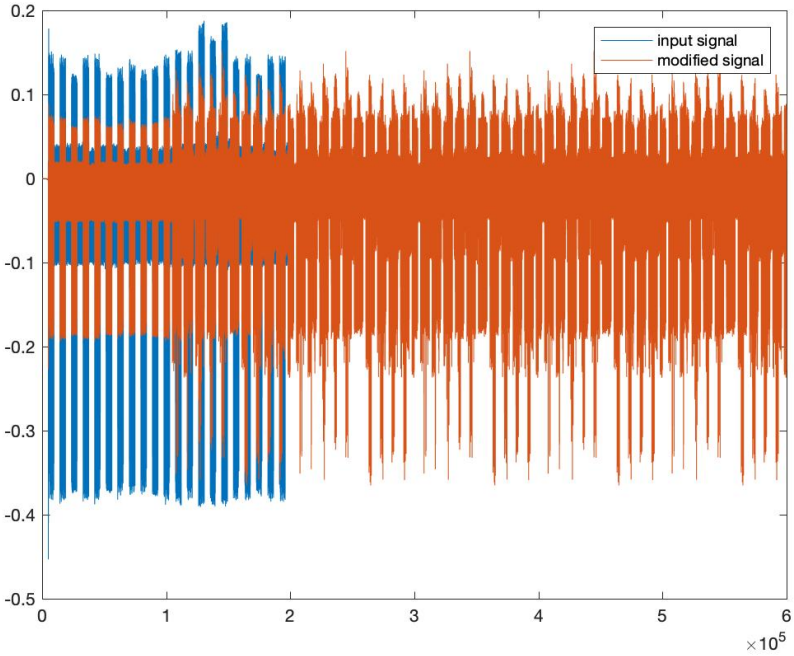
The original audio signal and the modified signal is shown below in the same figure:



(c) The STFT of the original signal "chiptune_noaudio" after system 3 applied over the time domain os the STFT is shown below:

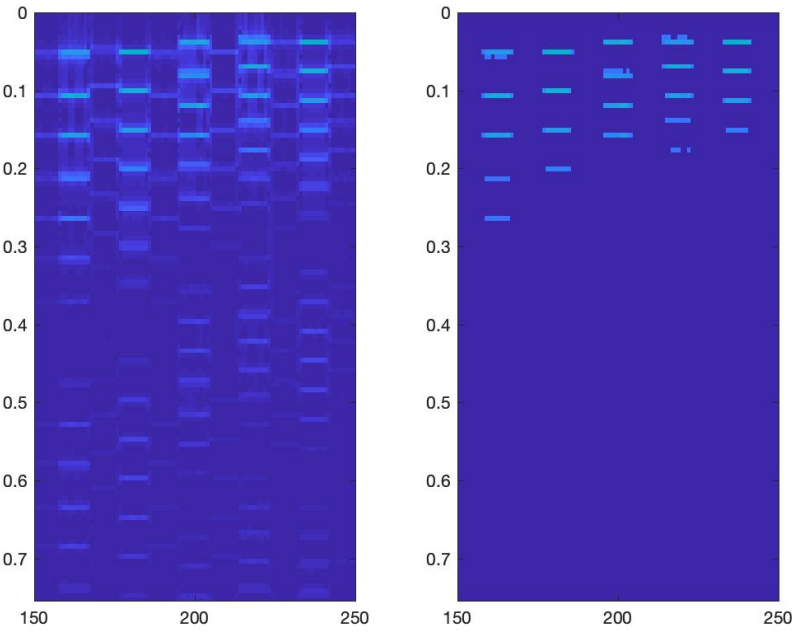


The original audio signal and the modified signal is shown below in the same figure:

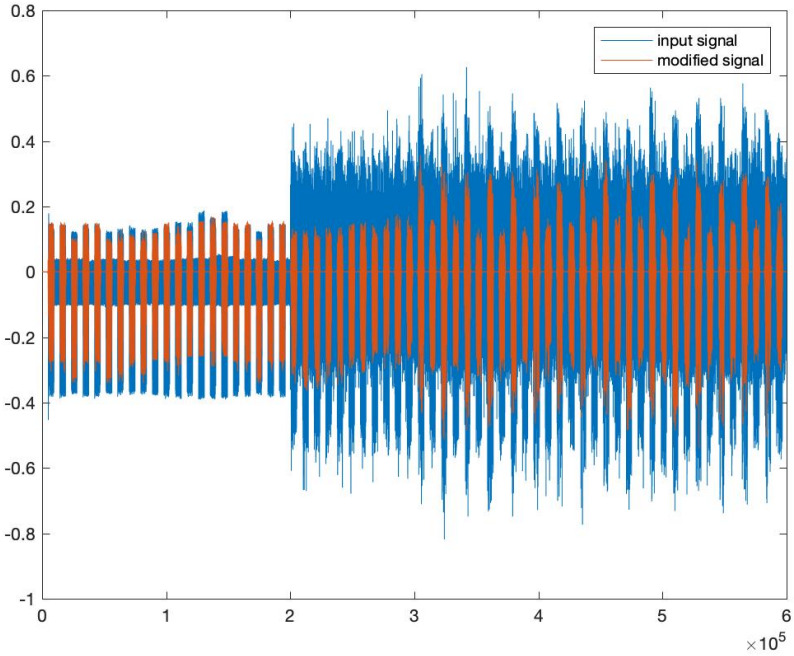


Question #4:

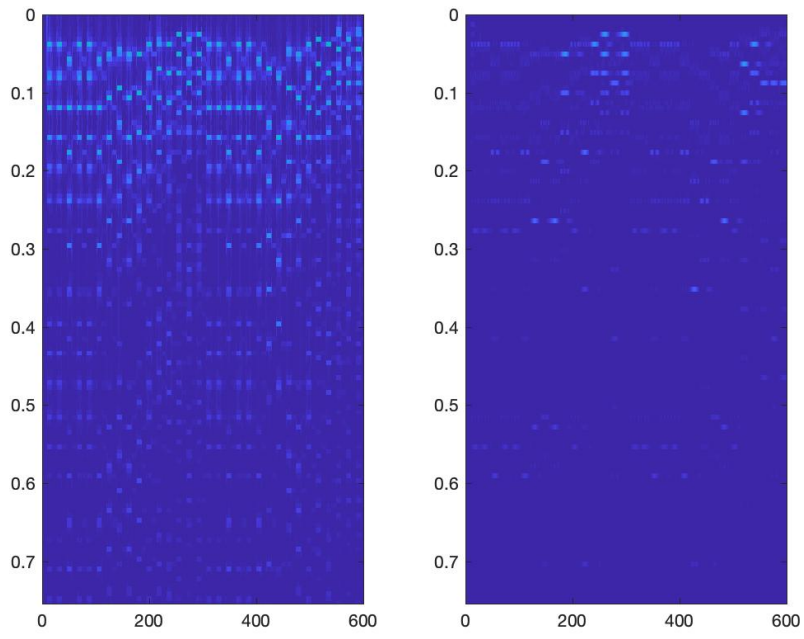
(a) The STFT of the original signal "chiptune_noise" after system 1 applied across the frequency domain and with the overlap-add STFT is shown below:



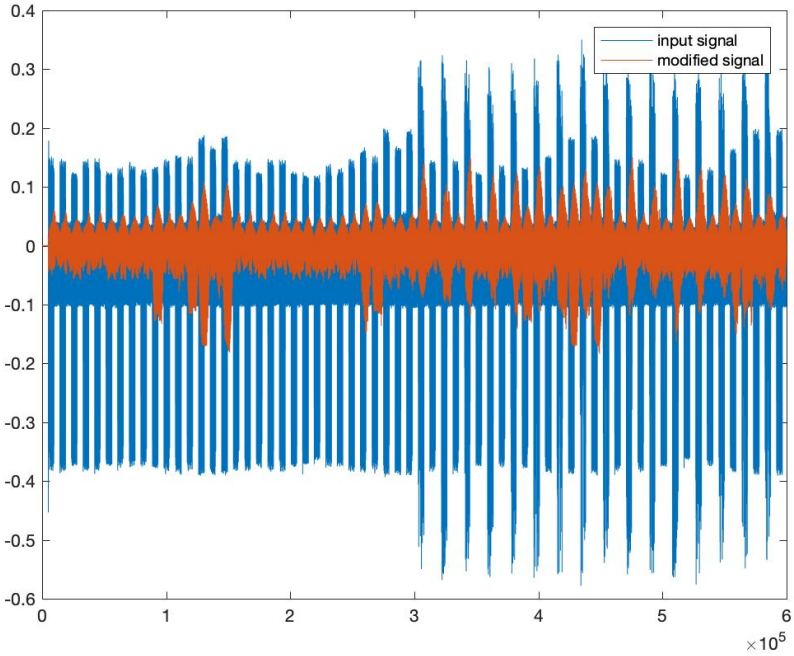
The original audio signal and the modified signal is shown below in the same figure:



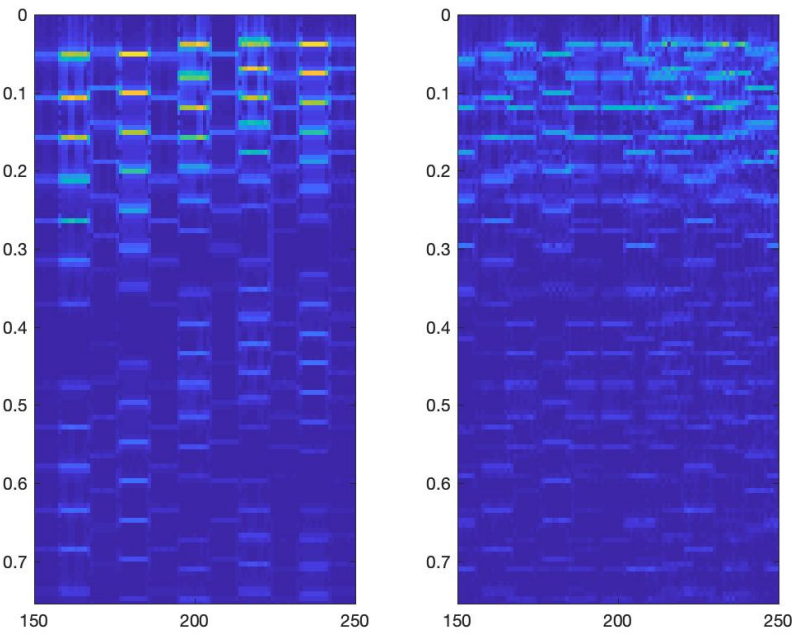
(b) The STFT of the original signal "chiptune_normal" after system 2 applied across the frequency domain and with the overlap-add STFT is shown below:



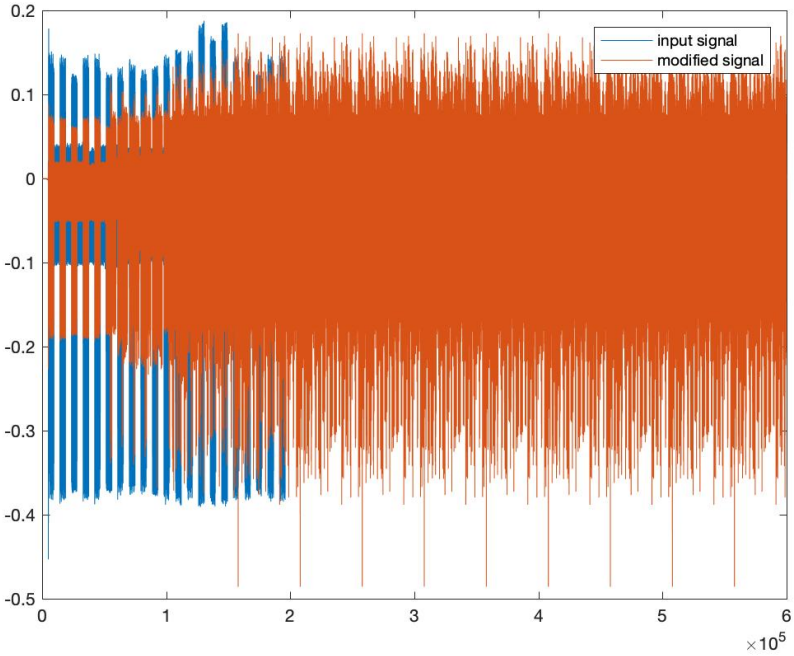
The original audio signal and the modified signal is shown below in the same figure:



(c) The STFT of the original signal "chiptune_normal" after system 3 applied across the frequency domain and with the overlap-add STFT is shown below:



The original audio signal and the modified signal is shown below in the same figure:


input signal
modified signal
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
0
1
2
3
4
5
6
×10^5