

UNIVERSITY OF MIAMI
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
MMI361/EEN502

Fall 2009

Homework No.1

Submit solutions to the following Matlab exercises:

- 1) Write a Matlab function that reads a user-defined stereo soundfile stored in WAV format and plots the left and right channel on a single figure window (using `subplot`). The function places appropriate labels on the axes and titles on the plots. It also saves the figure using `print filename -djpegxx -rxxx`, where `djpegxx` specifies the quality of the jpeg image between 00 and 100, and `rxxx` specifies the resolution (i.e., viewable size) of the image, and both are user-defined.
- 2) Write a Matlab program that generates T seconds of a 440-Hz tone at a sampling rate of 8000 Hz and plays it out. It plots 4 cycles of that tone. It generates its 4th, 5th and 6th harmonic components and adds them to create a new signal, which it plays out. Then it plots a section of that new signal in the same figure as the 440 Hz plot. Keep time durations the same. Finally, it saves the two signals in two separate WAV files, and also as a stereo WAV file with each of the channels comprising the two signals.
- 3) Write a Matlab function that generates N-points of Gaussian random noise and an equal number of uniformly distributed noise. On the same figure window it plots 100 points of each and the N-point histogram of each, all on a 2x2 figure grid. Now write a program that reads in a WAV soundfile (mono or stereo) and uses the defined function to add that noise to the sound signal. It plays back both the clean and the noisy sound.
- 4) Only for graduate and ECE students: Use the noise function defined in question 3 to add to any mono or stereo audio signal either Gaussian or uniform noise at any user-specified signal-to-noise ratio. Write the function that does all that.

Due date: Wednesday, 9/9/2008