## EEL 6586: HW#2

Assignment is due Friday, January 24, 2003 in class. Late homework loses  $e^{\# of \ days \ late} - 1$  percentage points. See the current late penalty at http://www.cnel.ufl.edu/hybrid/harris/latepoints.html

This assignment includes both matlab and textbook questions. You must both hand in your homework AND email your two audio files as attachments to to the TA (Lingyun Gu, lygu@cnel.ufl.edu) by the due date/time. Name your files with your first initial and lastname with -a for part a and -b for part b. So for example, my files would be called jharris-a.wav and jharris-b.wav Use a subject line of "EEL6586 HW#2 your full name", so for example my subject line would be "EEL6586 HW#1 John Harris"

## PART A: Recording a voiced phoneme

- A1 Record yourself on a computer saying the phoneme /i/ for about 0.5 seconds. Remember the /i/ is the vowel sound in "me". Make sure to hold the microphone to the side of your mouth to reduce noise from the airflow. Email in the sound file as described above. The preferred format is an 8KHz .wav file. If you have no capability to record sound on a PC and have no friends who can help, talk to the TA. The recording must be your voice.
- A2 Hand in a portion of the time domain plots for the phoneme showing a few pitch periods. The axes of this plot (and all plots) should be clearly labelled. Clearly indicate the pitch period and note its numerical value. Also, list the pitch frequency.
- A3 Plot the magnitude spectrum of the phoneme. Clearly indicate the values of  $F_1$ ,  $F_2$  and  $F_3$  on the graphs. Also show the log magnitude plot.
- A4 Estimate the bandwidth and amplitude of each formant using whichever definition you like. However, be sure to explain your calculation.

## PART B: Recording a full sentence

- B1 Record yourself on a computer saying the sentence "Please do this today." Include the wav file in your email as described above. Include a time-domain plot of the full waveform in what you turn in.
- B2 Hand in a plot of a narrow-band spectrogram. What size window did you use(in ms)? Briefly explain what features are visible compared to a wide-band spectrogram.
- B3 Hand in a plot of a wide-band spectrogram. What size window did you use (in ms)? Briefly explain what features are visible compared to a narrow-band spectrogram.
- B4 On one of the spectrograms, annotate each phoneme of the sentence, showing roughly the beginning and end time with arrows. Use the symbols in Figure 3.17 (in parentheses of Quatieri). Explain how you decided the phoneme boundaries.

## PART C: Textbook Problems

- 3.1
- 3.8