Name: _____

Assignment 5: Speech Scrambler

Due: Tuesday, May 19

1. _____ /10

2. _____ /10

3. _____ /10

4. _____ /10

5. _____ /10

6. _____ /10

Total:_____ /60

The objective of this exercise is to implement a simple digital speech scrambler. Prior to that, we suggest you visit the website *Audacity*. This website provides the basic tools for *A/D* and *D/A* conversions. The TA will walk through the tools with you during the discussion session.

Use the microphone of your computer to record a short speech signal, and then digitize the speech signal with the *A/D* tool.

Part A: Scrambling

1. Display the *FFT* spectrum of the digitized speech signal.
2. Apply the speech scrambling procedure and then display the *FFT* spectrum of the scrambled speech signal.
3. Use the *D/A* tool to convert it back to an analog signal to check if it is audible.

Part B: Descrambling

4. Repeat the process as the descrambling procedure to reconstruct the speech signal and check if it is audible.

Part C: Performance evaluation

5. Compare the FFT spectrum of the descrambled signal with the FFT spectrum of the original speech signal.
6. Propose a simple formula for the calculation of scrambling-descrambling procedure distortions. Then check your reconstructed waveform against the original speech signal and evaluate the distortions.