Homework Assignment:

1. Fixing Matlab's fft function:
   a. Create a new Matlab function that takes the FFT of a time series vector and returns the correct value of the linear spectrum. Be sure to shift the linear spectrum to the correct frequency vector.
   b. Similarly, create a new Matlab function that performs an IFFT on the linear spectrum that you created in Part a.
   c. Demonstrate that these functions work by generating a sine wave and plotting the time series and the results of your two new functions. (Don't forget to perform a Parseval sum check!)

2. Recording and playback in Matlab
   a. Go to the mathworks help page for the audiorecorder function (Easy way to find it is just by googling "matlab audiorecorder"). Read the page to learn how to record audio in matlab.
   b. Use the audiorecorder function to record 3-10 seconds of audio. If your computer does not have a microphone, I recommend purchasing a Dayton Audio iMM-6 calibrated measurement mic ($22 on Amazon), or ask Prof. Lawless about borrowing one. As a last-minute "solution," plug a pair of headphones into the microphone jack.
   c. Listen to the recording.
   d. Plot the time series of the recording.
   e. Plot the magnitude and phase of the linear spectrum.
   f. Save the recording as a .wav file.

3. Extracting Data from a long time series
   a. Download 'EID465 – HW 1 – EFP.wav' from Moodle.
   b. Plot the time series and the linear spectrum. Are you able to make sense of the data?
   c. Extract just a portion of the data from t = 2.0 to t = 2.6. What is the predominant frequency during this time period?