ECE 340, Exam #2 Review, Fall 2011

Sections Covered Since Last Exam: 6.4 – 6.5, 7.1 – 7.6, 4.1 – 4.3, 4.8

For this exam, in addition to material from previous exams, you should be able to:

- Use the Fourier Series and linearity to determine the output of a LTIC system due to a periodic input signal
- Compute the generalized Fourier Series coefficients of a signal in terms of given basis signals
- Prove that an approximate signal expansion is optimal by showing that error is orthogonal to the approximation
- Evaluate Fourier Transform and inverse Fourier Transform via integration
- Evaluate Fourier Transform and inverse Fourier Transform by applying known pairs and properties
- Evaluate Fourier Transforms of semi-periodic and periodic pulse trains
- Plot the magnitude and phase response of a frequency spectrum
- Apply and recognize symmetries in Fourier Transform pairs and Fourier Series coefficients
- Use the convolution property of the Fourier Transform to compute the output of a LTIC system
- Calculate the group delay of a LTIC filter
- Identify ideal and practical filters
- Apply the Paley-Wiener theorem to a filter's frequency response to determine if it is a practically realizable filter
- Sketch changes to a filter response when truncated in the time domain with a window function
- Apply Parseval's theorem to compute the energy of a signal in the time or frequency domain (also, the energy in a finite band of frequencies)
- Evaluate Laplace Transforms via integration (including the region of convergence)
- Evaluate Laplace Transforms and inverse Laplace Transforms by applying known pairs and properties
- Evaluate Fourier Transforms by evaluating Laplace Transforms along the $j\omega$ axis (when within the ROC)
- Evaluate inverse Laplace Transforms via partial fraction expansion
- Solve linear differential equations using Laplace Transforms
- Apply initial conditions and/or input signals to find the total, zero-input, and/or zero-state responses of a LTIC system using Laplace Transforms
- Use the Fourier Transform to find the steady-state output of a LTIC system due to sinusoidal inputs