ECE 340, Exam #1 Review, Fall 2011

Sections Covered: 1.1 – 1.7, 2.3 – 2.4, 2.6 – 2.7, 6.1, 6.3

For this exam, you should be able to:

- Recognize and manipulate fundamental signals such as the unit step, unit impulse, and exponential
- Properly apply the sifting/sampling property of the unit impulse (delta function)
- Sketch exponential signals with complex frequency (s)
- Recognize/determine whether a signal is a power signal or an energy signal
- Calculate a signal's energy or average power
- Apply basic signal operations such as time shifting, time scaling, and time reversal
- Classify signals as continuous/discrete time, periodic/aperiodic, causal/anti-causal, deterministic/random, and even/odd
- Determine and show if a system is linear or non-linear
- Determine and show if a system is time-invariant or time-varying
- Determine if a system is "instantaneous" or "dynamic"
- Determine and show if a system is causal or non-causal
- Determine a LTI system's impulse response from the differential equation I/O relationship (the impulse matching method)
- Understand and apply principles of the impulse response, linearity, and time invariance to compute the output of a system due to simple inputs
- Calculate system output via direct evaluation of the convolution integral
- Calculate system output via graphical understanding of the convolution integral
- Apply convolution properties (commutative, distributive, associative, shift, convolution with impulse, width of output, simplification of convolution integral for causal system) to calculate system output
- Sketch $x(\tau)$ and $h(t-\tau)$ for arbitrary and/or specific values of t
- Calculate the Transfer Function (Laplace Transform) of an LTI system and use to calculate the response of the system to a sinusoidal input (or sum of sinusoidal inputs) with complex frequency s
- Determine whether a system is BIBO stable given either the system impulse response or transfer function
- Determine whether a signal is periodic, and if so, its fundamental period or frequency
- Calculate the trigonometric and/or exponential Fourier Series of a periodic signal
- Apply symmetry properties of the Fourier Series to determine if given Fourier Series coefficients are due to an even/odd signal (or vice versa)
- Calculate trig Fourier Series coefficients from Exp Fourier Series, and vice versa
- Recognize and apply symmetry in the coefficients of the exponential Fourier Series
- Sketch the Fourier Series spectrum of a periodic signal (magnitude and/or phase)
- Calculate the bandwidth of a signal
- Calculate the average power of a signal using Parseval's Theorem
- Topics from the first-day prerequisite test