**You need to know the following topics for test 2 of Signals and Systems**

1. Find the Laplace transform *X*(*s*) for signal *x*(*t*) using the integral.
2. Find the Laplace transform *X*(*s*) for signal *x*(*t*) using the Laplace properties and table.
3. Find the signal *x*(*t*) by the inverse Laplace transform of *X*(*s*) using the partial fraction expansion, Laplace properties, and the table.
4. Given the differential equation of a system, the input *x*(*t*), and the initial conditions of the system, you should be able to find the transfer function *H*(*s*), the zero-input response, the zero-state response, the forced response, the natural response, or the total response for a given input *x*(*t*).
5. Given the system differential equation or the transfer function *H*(*s*), you should be able to find the frequency response *H*(j*ω*), its magnitude and phase. If a dc or sinusoidal input is given, then you should be able to find the output *y*(*t*) and the steady state response.
6. Given the system differential equation or the transfer function *H*(*s*), you should be able to find the poles and zeros of the system and determine its external and internal stability.
7. Given a transfer function *H*(*s*), you should be able to draw the canonical Form II realization, cascade and parallel realization, block diagram with amplifier, integrator, and summing amplifier.
8. Given the transfer function *H*(*s*), you should be able to draw the poles and zeros on the s-plane and draw a rough plot of the magnitude of the frequency response |*H*(jω)|.
9. Design a filter that meets determined specifications or a given plot of |*H*(jω)|.