EE 572

Exam II Objectives

At the time of the second exam in EE572, you should be able to perform the following objectives:

Exam II Objectives:

- Do all Exam I objectives!!
- Design full-order observers, improved observers, and ~~reduced-order~~ observers for discrete multi-input detectable systems.
- Understand and design deadbeat regulators/observers
- Derive and apply the separation principle
- Develop C programs to implement digital filters, controllers, and observers
- Develop C programs to implement digital lead, lag, and PID compensators
- Derive and use the bilinear transform
- Find a model for the sample-and-hold process in the s-plane and the Z-plane (make sure to divide by T_s!)
- Determine Z-plane regions to meet transient specifications
- Determine system type number in both the s-plane and the Z-plane
- Define Kp, Kv, Ka in the S-plane and the Z-domain
- Measure steady-state error for common inputs in both the s-plane and the Z-plane
- Obtain models for discrete systems from either time or frequency responses
- Perform root locus lead compensation on sampled data systems in either the Z-plane or the s-plane
- Perform root locus lag compensation on sampled data systems in either the Z-plane or the s-plane
- Perform root locus PID compensation on sampled data systems in either the Z-plane or the s-plane
- Use other methods such as Ziegler-Nichols to tune PID compensators
- Determine the effects of sampling time on stability of 2nd order systems from a time domain point of view
- Experimentally develop Bode plots of actual open-loop sample-data systems and use them to find transfer functions
- Understand and apply the Mapping Theorem to derive the Nyquist stability criterion
- Obtain polar plots and subsequently Nyquist plots from either a Bode plot or knowledge of GzohG(s)
- Measure gain and phase margins both theoretically and from a Bode or steady-state sinusoidal plots
- Design simple gain and lead (not lag) compensators to meet the following criteria:
  - Steady-state error specifications
  - Frequency specifications (gain and phase margins)