ENGR 511
Spring 2024 Midterm Study Guide

Objective:

To provide a semester midterm summary test to determine mastery and knowledge gaps for the student and to provide a means for the instructor to address the gaps.

Overview of Topics:

1. Control System Basics
    a. 10 questions about control systems terminology and subject matter
        i. Example: What is an open and closed loop system and what are the advantages and disadvantages of each.
    b. What are the response characteristics of a control system
        i. Response and settling times, Overshoot, steady state, error.
2. Control Systems Mathematics
    a. A series of time and frequency functions to show your ability to use Laplace Transforms (and inverse Laplace) to go from time to frequency domains
        i. Know how to do partial fractions
    b. Know how to take the complex conjugate
3. System Response
    a. Demonstrate how to obtain a transfer function
        i. Some circuits will be presented for your analysis
    b. What is the transfer function order, poles, and zeros
4. System Response Behavior
    a. Demonstrate your knowledge of the initial and final value theorems
        i. A transfer function will be provided for analysis
5. General Forms of Transfer Functions
    a. Determine the time constant from the transfer function
    b. What is the DC Gain
    c. What is the system Gain
6. Bode Plots
    a. Analyze a simple circuit and draw out a Bode Plot approximation (non-Log).
    b. Discuss low and high frequency conditions and the cutoff frequency at 0.707 max amplitude
7. Stability
    a. Determine if a system is stable using the Routh-Hurwitz criteria
8. BONUS: Sensitivity
    a. What is the sensitivity of a system with specific parameters provided.