

Last Name: _____ First Name: _____
Student ID: _____

EME172: Automatic Control of Engineering Systems
Summer Session 2, 2007
Homework 5
Due Tuesday, July 31, 2007
(200 points)

1. Read Chapter 8 (8.1-8.8), Chapter 9 (9.1-9.4), and Chapter 10 (10.1-10.2, 10.7-10.8, and 10.10-10.11) in the textbook *Control Systems Engineering*.
2. (20 points) Problem 8-2(a, c, d, f).
3. (40 points) Problem 8-14.
 - a. Sketch the root locus.
 - b. Find the asymptotes.
 - c. Find $j\omega$ -axis crossing and the corresponding K .
 - d. Find breakaway point and the corresponding K .
4. (20 points) Use control toolbox to plot the root locus of the system in Problem 3, and check your results of (c) and (d).
5. (30 points) Problem 9-5.
6. (40 points) Problem 9-13.
7. (30 points) Problem 10.37.
 - a. Draw the Bode Plots by hand.
 - b. Find the Gain margin and phase margin from the Bode plots in (a).
 - c. Use control toolbox to plot the Bode plots.
8. (20 points) Check your root locus in Problem 3 and Bode plots in Problem 7 using Web-Based Control System Design and Analysis toolkit at <http://www.softintegration.com/webservices/control/>