

Concordia University
Department of Computer Science and Software
Engineering

SOEN 385-Control Systems and Applications

Assignment No. 3

Due date: Thursday March 17, 2010

Some questions in this assignment are based on the textbook: Control Systems Engineering, 5th Edition, by N. S. Nise, John Wiley & Sons.

- 1) For each of the transfer functions shown below, find the locations of the poles and zeros, plot them on the s-plane, and then write an expression for the general form of the step response without solving for the inverse Laplace transform. State the nature of each response (overdamped, underdamped, and so on).

$$a) \quad T(s) = \frac{5(s+6)}{(s+5)(s+15)}$$

$$b) \quad T(s) = \frac{10}{s^2 + 4s + 20}$$

- 2) For each of the second-order systems that follow, find ζ , ω_n , T_s , T_p , T_r , and %OS.

$$T(s) = \frac{0.4}{s^2 + 0.2s + 0.4}$$

- 3) For the following second-order system specifications that follow, find the location of the second-order pair of poles: %OS = 20%, and $T_p = 5$ sec.
- 4) Do Problem 26 on page 208 in Chapter 4
- 5) Do problem 69, page 216 in Chapter 4