

Concordia University
ELEC372 Fundamentals of Control Systems

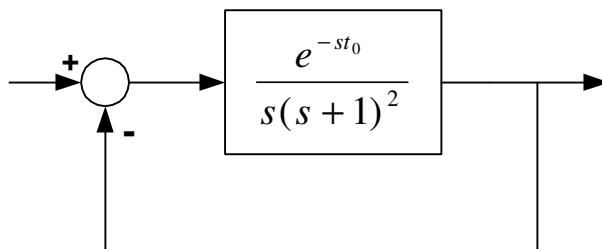
Homework #10

Professor Amir G. Aghdam

1. Problem P9.3 from the 8th, 9th, 10th, 11th, 12th, 13th or 14th edition of the main textbook.
2. (Automatic Control Systems by Farid Golnaraghi and Benjamin C. Kuo, Eighth Edition, John Wiley & Sons, Inc.) “The characteristic equation of a linear control system is given in the following equation. Apply the Nyquist criterion to determine the values of K for system stability. Check the answers by means of Routh-Hurwitz criterion.”

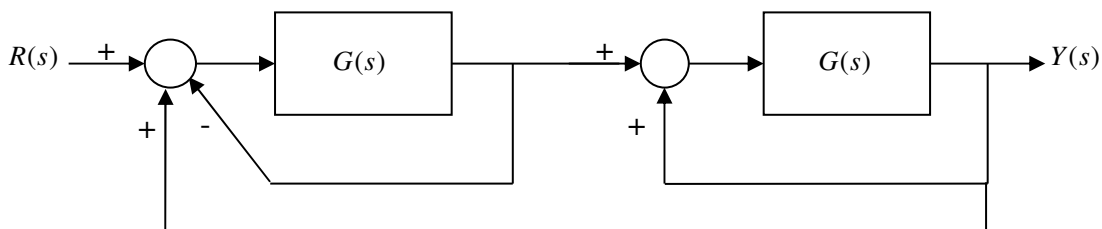
$$s(s^3 + 2s^2 + s + 1) + K(s^2 + s + 1) = 0$$

3. Consider the following closed loop system:



Apply the Nyquist criterion to find the maximum t_0 , which makes the closed loop system stable.

4. (Automatic Control Systems by Farid Golnaraghi and Benjamin C. Kuo, Eighth Edition, John Wiley & Sons, Inc.) “The block diagram of a feedback control system is shown in the following figure:



- (a) Assume that $\frac{K}{(s+4)(s+5)}$. Apply the Nyquist criterion to determine the range of K for stability.
- (b) Check the answer obtained in part (a) with the Routh Hurwitz criterion.”