

ELEC 312 - Systems I

Homework Assignment 5

Due Wednesday, March 18, 2015 for Section 01

Due Wednesday, March 18, 2015 for Section 81

1. Chapter 6, Problem 3, *Control Systems Engineering*:

Using the Routh table, tell how many poles of the following function are in the right half-plane, in the left half-plane, and on the $j\omega$ -axis.

$$T(s) = \frac{s + 8}{s^5 - s^4 + 3s^3 - 3s^2 + 3s - 2}$$

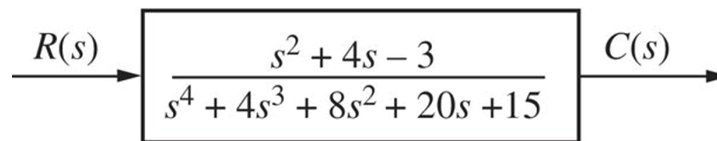


Figure P6.1

2. Chapter 6, Problem 5, *Control Systems Engineering*:

How many poles are in the right half-plane, in the left half-plane, and on the $j\omega$ -axis for the open-loop system of Figure P6.1 above?

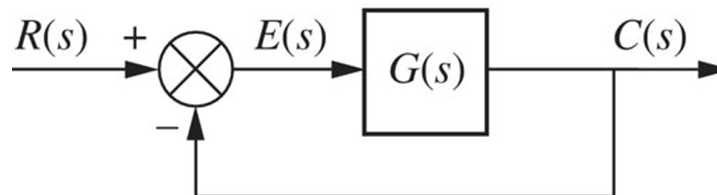


Figure P6.3

3. Chapter 6, Problem 33, *Control Systems Engineering*:

Given the unity feedback system of Figure P6.3 above with

$$G(s) = \frac{K(s + 4)}{s(s + 1.2)(s + 2)},$$

find the following (using **ONLY** a Routh table):

- The range of K that keeps the system stable
- The value of K that makes the system oscillate
- The frequency of oscillation when K is set to the value that makes the system oscillate