

Name:
ID. No.

Eskişehir Osmangazi University - Electrical Engineering Department
Fundamentals of Control Systems
Final Examination - Spring 2014

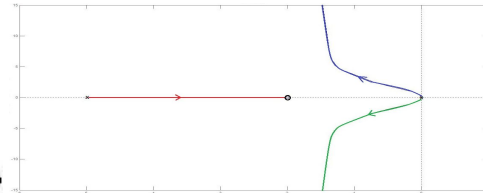
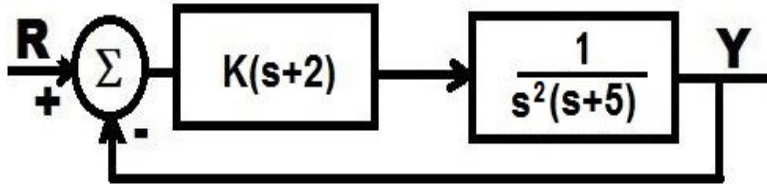
All answers must be written in the appropriate neighborhoods of the questions. Anything written elsewhere will not be graded. Use the back side of the exam sheet if you need scratch paper.

Question 1.

30 pts. (a) Sketch the root loci for the configuration below. Show trajectory directions by arrows.

(b) Is this system stable for $K = 5$?

(c) Find K value corresponding to the closed loop pole $s = -3$.



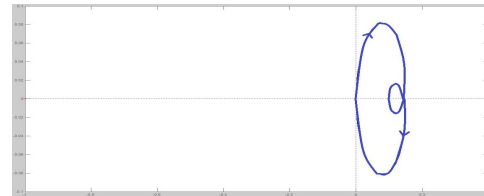
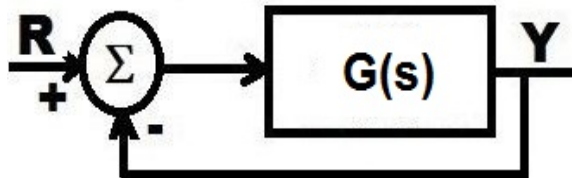
(b) Yes (c) 18

Question 2.

30 pts. (a) Let $G(s) = \frac{s+1}{(s+2)(s+5)}$. Sketch the Nyquist plot for the configuration below.

(b) How many times is the $(-1,0)$ encircled in the $G(s)$ plane?

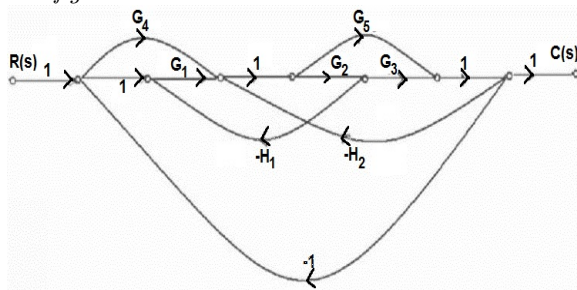
(c) Is this system stable?



(b) 0 (c) Yes

Question 3.

20 pts. Find the transfer function $\frac{C(s)}{R(s)}$ for the configuration below



$$\frac{G_1 G_2 G_3 + G_4 G_2 G_3 + G_1 G_5 + G_4 G_5}{1 + G_1 G_2 H_1 + G_5 H_2 + G_2 G_3 H_2 + G_4 G_5 + G_1 G_2 G_3 + G_4 G_2 G_3 + G_1 G_5}$$

Question 4.

$$y(n+2) = 0.2y(n) + u(n) \quad (a) \frac{1}{z^2 - 0.2}$$

(a) 10 pts. Find the transfer function $\frac{Y(z)}{U(z)}$.

(b) 10 pts. Is this system stable?

Good Luck
A. Karamancıoğlu