Name:
ID. No.

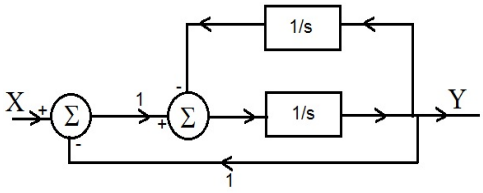
Eskişehir Osmangazi University - Electrical Engineering Department
Fundamentals of Control Systems
Midterm Examination - Summer 2015

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.

[20 pts.] For the configuration on the right, write the transfer function $\frac{Y(s)}{X(s)}$ *in the form* $\frac{a_m s^m + a_{m-1} s^{m-1} + \cdots}{a_n s^n + a_{n-1} s^{n-1} + \cdots}$.

$\frac{s}{s^2+s+1}$

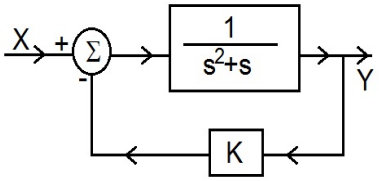


Question 2.

[30 pts.] Which of the following transfer functions represent BIBO stable LTI systems?
(a) $\frac{s-1}{s+1}$ *(b)* $\frac{s-1}{(s+1)^2}$ *(c)* $\frac{s+1}{s^2+3s}$ *(d)* $\frac{s-2}{s^2+1}$ *(e)* $\frac{1}{(s+1)^2+8}$ *(f)* $\frac{s-1}{(s+1)(s^2+3)}$ *(g)* $\frac{7}{s}$
abe

Question 3.

[30 pts.] Step function with amplitude 5 *is applied the configuration on the right, find the rise time and peak time when* $K = 5$.
$t_r = 0.82,\ t_p = 1.44$



Question 4.

[20 pts.] Let $p(s) = s^4 + 2s^3 + 2s^2 + 3s + 1$.
(a) Form the Routh table for p.
(b) How many roots does $p(s) = 0$ *have in the open left half plane?*
(a)
1 2 1
2 3
$\frac{1}{2}$ *1*
-1
1
(b) 2

Good Luck
A. Karamancıoğlu