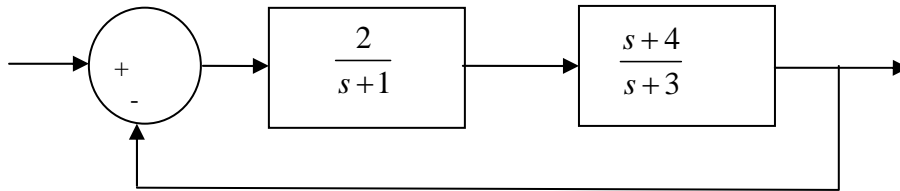


ECE-320, Practice Quiz #4

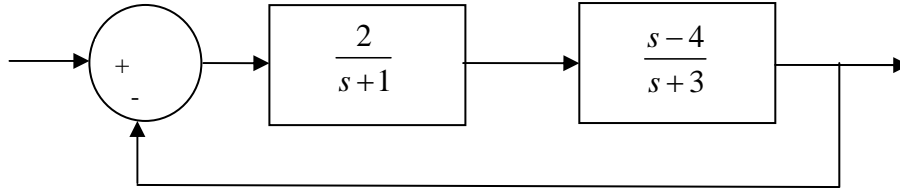
1) For the following system



The dynamic prefilter which cancels the closed loop zeros and produces a zero steady state error for a unit step input is

- a) $\frac{11}{s+4}$ b) $\frac{11}{2(s+4)}$ c) $\frac{11}{s+4}$ d) $\frac{3}{2(s+4)}$

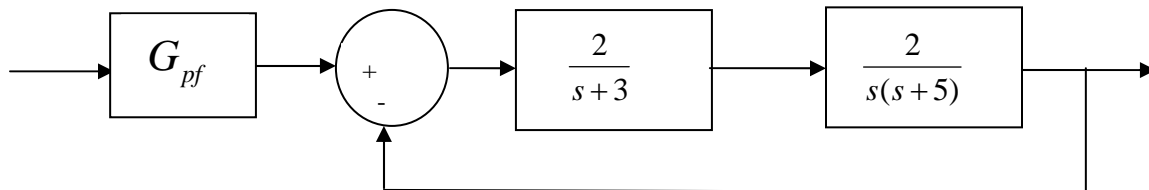
2) For the following system, is it possible to construct a dynamic prefilter to cancel the closed loop zero and produce a zero steady state error for a unit step input?



- a) yes b) no

3) For the block diagram below, the value of the prefilter G_{pf} that produces zero **steady state error** for a unit step input is:

- a) 1 b) 3/2 c) 3 d) 1/3



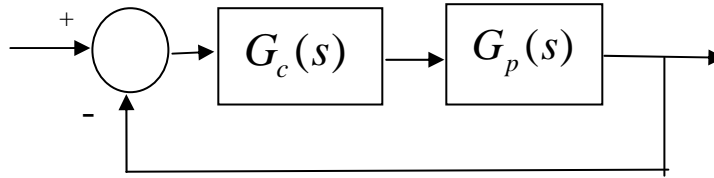
4) The second order ITAE transfer function can be written as

$$G_o(s) = \frac{\omega_0^2}{s^2 + 1.4\omega_0 s + \omega_0^2}$$

Increasing ω_0 has what general effect on the settling time, T_s ?

a) it increases T_s b) it decreases T_s c) it has no effect on T_s

5) For the following system

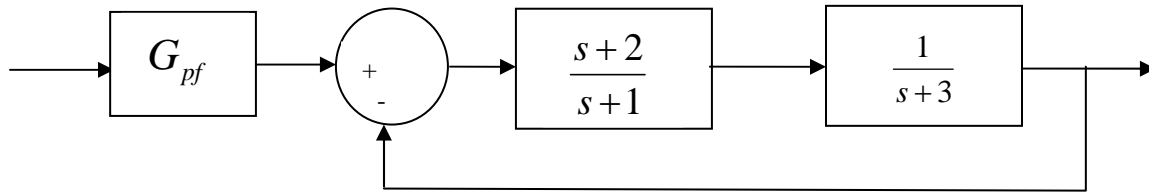


if the plant is $G_p(s) = \frac{2}{s+3}$ and the desired closed loop transfer function is

$G_0(s) = \frac{5}{s^2 + 2s + 5}$, then the required controller is

a) $G_c(s) = \frac{5(s+3)}{s(s+2)}$ b) $G_c(s) = \frac{5(s+3)}{2s(s+2)}$ c) $G_c(s) = \frac{(s+3)}{2s(s+2)}$ d) none of these

Problems 6-8 refer to the following system:



6) Assuming the prefilter G_{pf} is 1, the **position error constant** K_p is best approximated as

- a) $2/3$ b) $2/5$ c) 1 d) 0

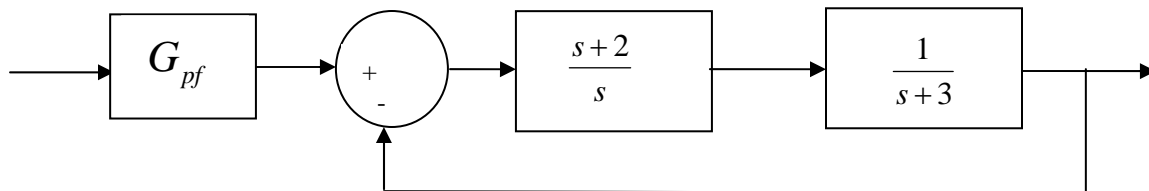
7) Assuming the prefilter G_{pf} is 1, the **steady state error** for a unit step is best approximated as

- a) $1/3$ b) $3/2$ c) $3/5$ d) $2/5$

8) The value of the prefilter G_{pf} that produces a **steady state error** of zero is:

- a) 1 b) $3/2$ c) $5/2$ d) $1/3$

Problems 9-11 refer to the following system



9) Assuming the prefilter G_{pf} is 1, the **velocity error constant** K_v is best approximated as

- a) $2/3$ b) $2/5$ c) 1 d) 0

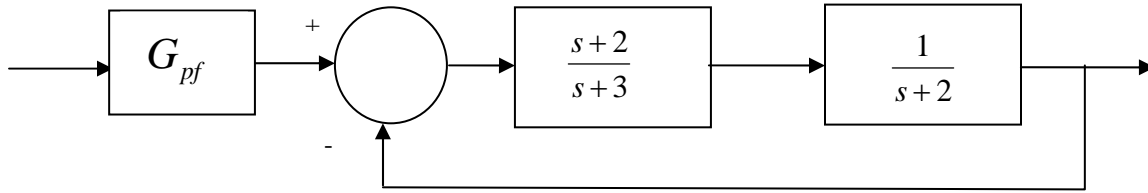
10) Assuming the prefilter G_{pf} is 1, the **steady state error** for a unit ramp input is best approximated as

- a) $1/3$ b) $3/2$ c) $3/5$ d) $2/5$

11) Assuming the prefilter G_{pf} is 1, the **steady state error** for a unit step input is best approximated as

- a) ∞ b) 0 c) $3/5$ d) $2/5$

Problems 12- 14 refer to the following system:



12) Assuming the prefilter G_{pf} is 1, the **position error constant** K_p is best approximated as

- a) 2/3 b) 1/3 c) 1 d) 0

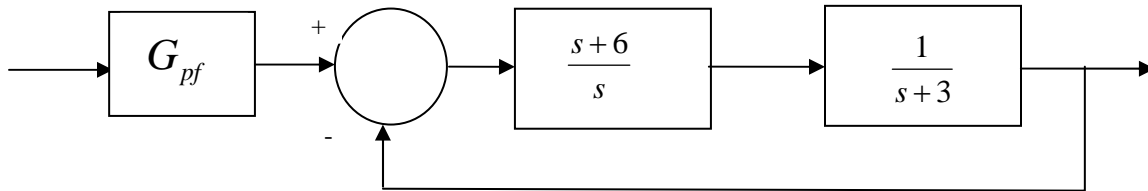
13) Assuming the prefilter G_{pf} is 1, the **steady state error** for a unit step is best approximated as

- a) 1/3 b) 2/3 c) 3/4 d) 4/3

14) The value of the prefilter G_{pf} that produces a **steady state error** of zero is:

- a) 1 b) 3/2 c) 4 d) 1/3

Problems 15-17 refer to the following system



15) Assuming the prefilter G_{pf} is 1, the **velocity error constant** K_v is best approximated as

- a) 2/3 b) 2 c) 1 d) 0

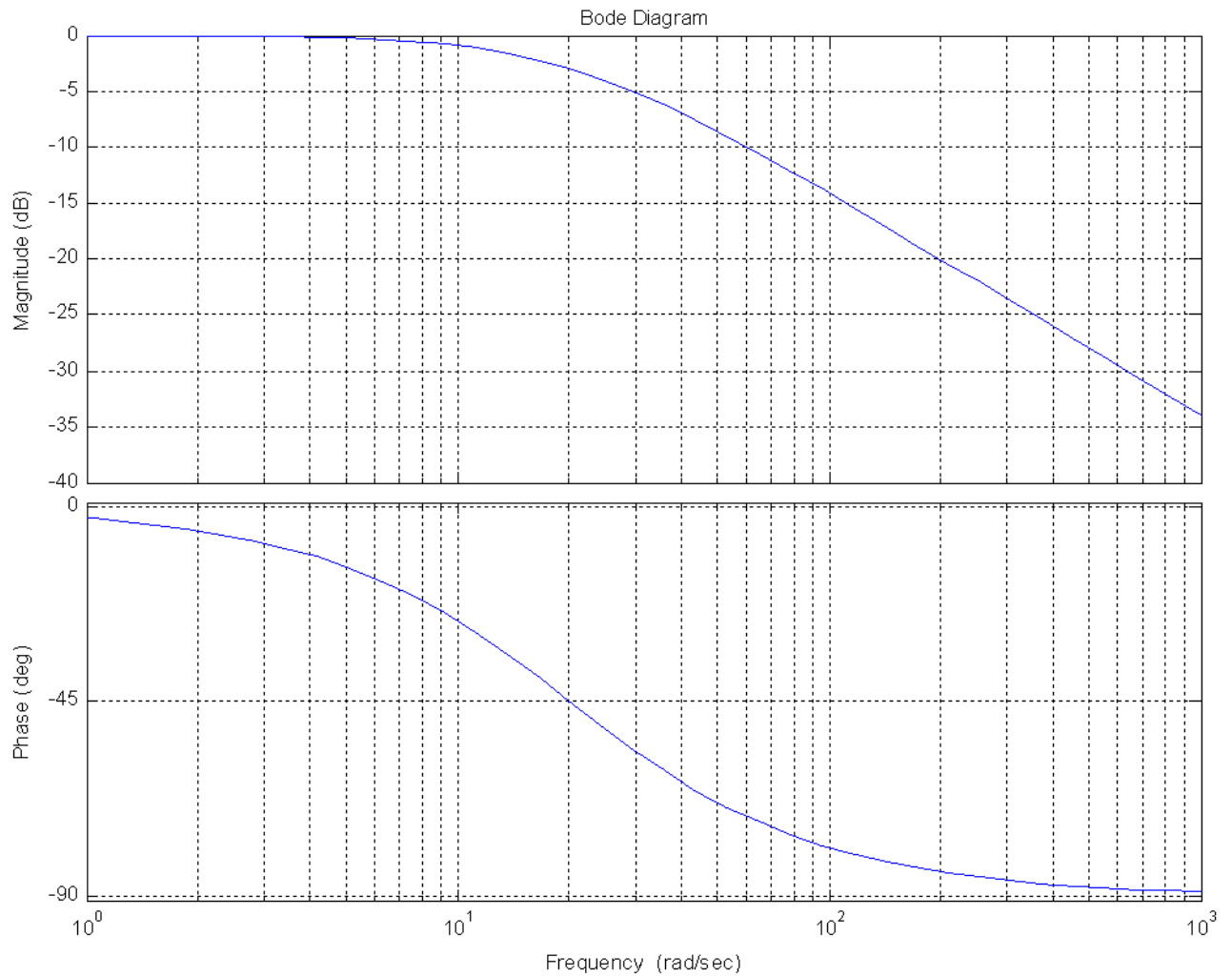
16) Assuming the prefilter G_{pf} is 1, the **steady state error** for a unit ramp input is best approximated as

- a) 1/2 b) 3/2 c) 2 d) 2/5

17) Assuming the prefilter G_{pf} is 1, the **steady state error** for a unit step input is best approximated as

- a) ∞ b) 0 c) 3/5 d) 2

18) For a system represented by the following Bode plot,



The (2%) settling time for this system is approximately

- a) $\frac{1}{20}$ sec b) $\frac{4}{20}$ sec c) $\frac{1}{10}$ sec d) $\frac{4}{10}$ sec e) none of these

Answers: 1-b, 2-b, 3-a, 4-b, 5-b, 6-a, 7-c, 8-c, 9-a, 10-b, 11-b, 12-b, 13-c, 14-c, 15-b, 16-a, 17-b, 18-b