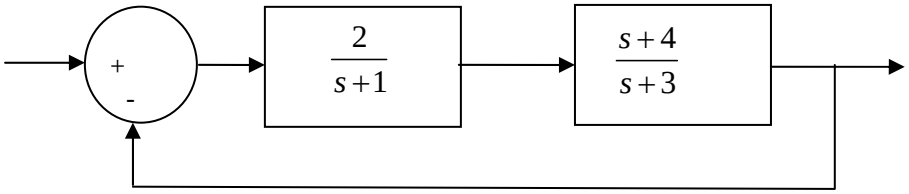
# ECE-320, Practice Quiz #4

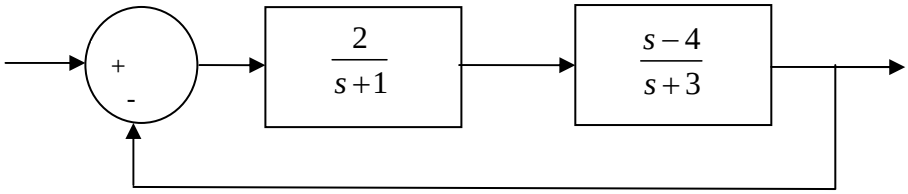
**1)** For the following system




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

a) $\frac{\frac{11}{8}}{s+4}$ b) $\frac{\frac{11}{2}}{s+4}$ c) $\frac{11}{s+4}$ d) $\frac{\frac{3}{2}}{s+4}$

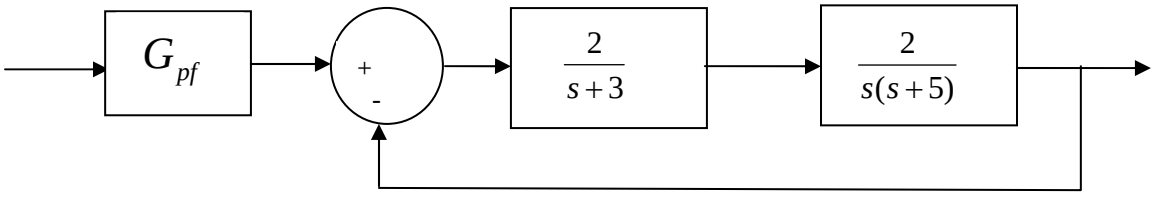
**2)** For the following system, is it possible to construct a dynamic prefilter to cancel the closed loop zero and produce a zero steady state error for a unit step input?




a) yes b) no

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

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



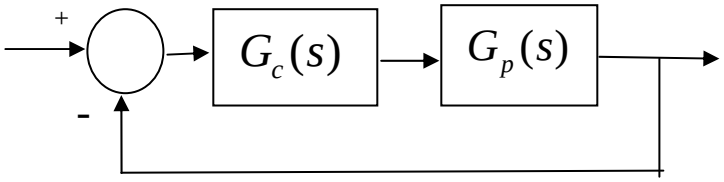
**4)** The second order ITAE transfer function can be written as

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

Increasing $\omega_0$ 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 $T_s$

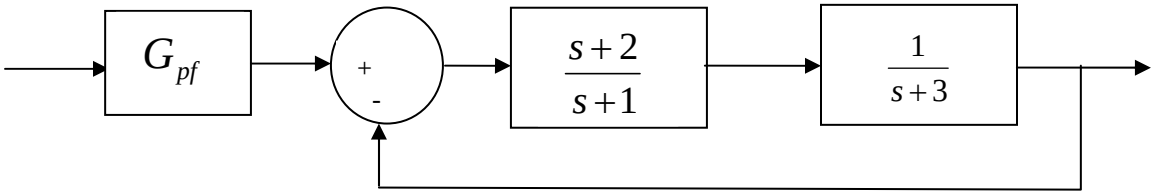
**5)** For the following system




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

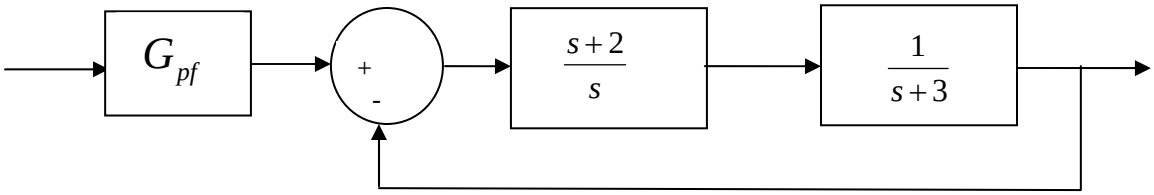
**7)** Assuming the prefilter $G_{pf}$ is 1, the **steady state error** for a unit step is best approximated as

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 9-11refer 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

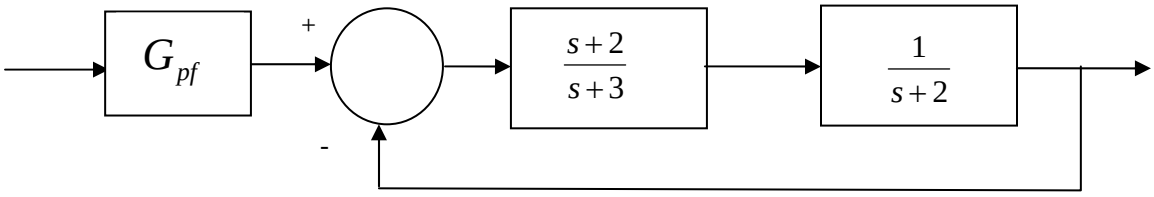
**10)** Assuming the prefilter $G_{pf}$ is 1, the **steady state error** for a unit ramp input is best approximated as

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) $\infty$ 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

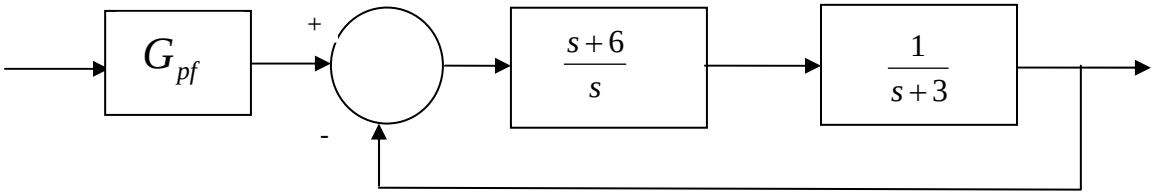
**13)** Assuming the prefilter $G_{pf}$ is 1, the **steady state error** for a unit step is best approximated as

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

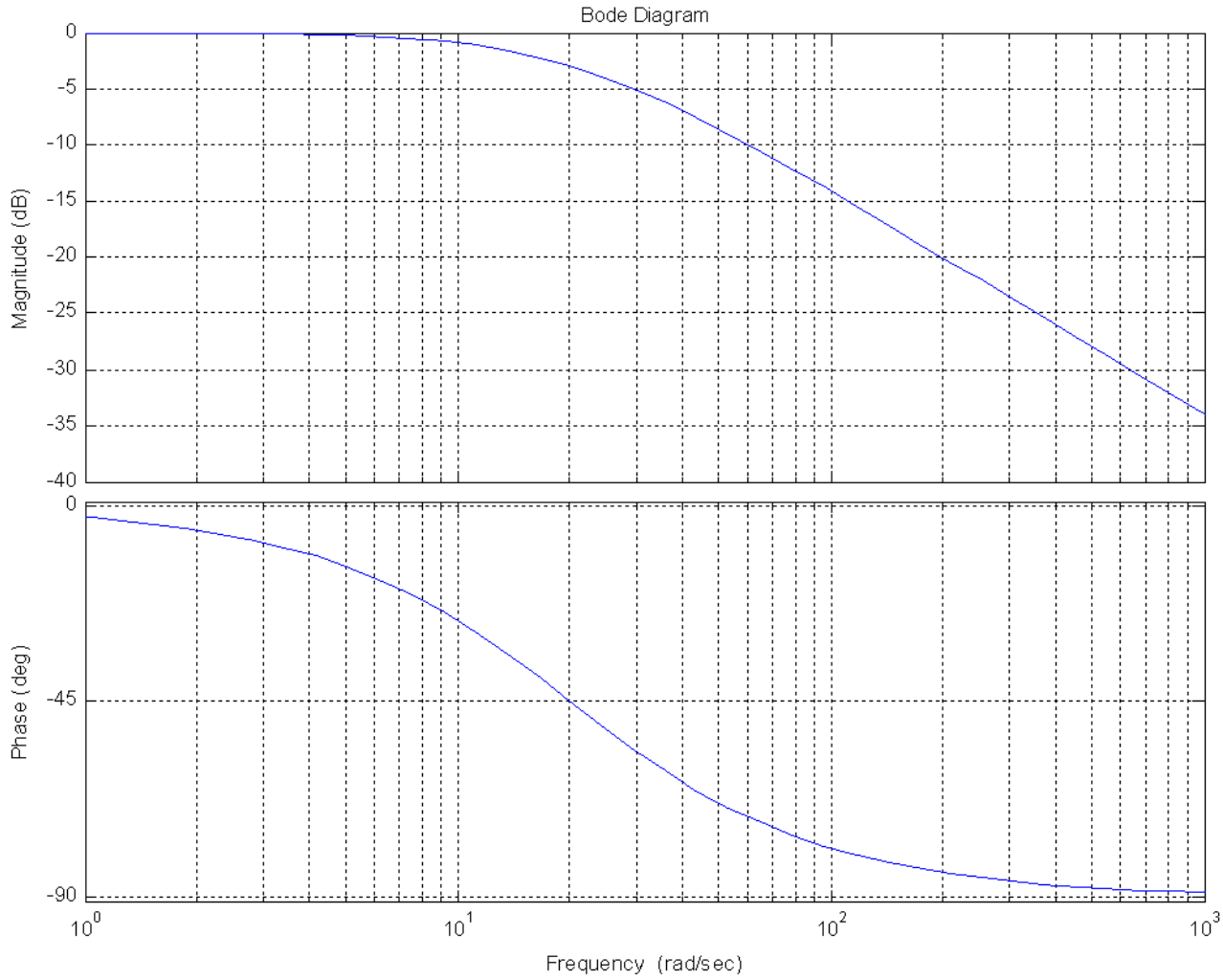
**16)** Assuming the prefilter $G_{pf}$ is 1, the **steady state error** for a unit ramp input is best approximated as

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) $\infty$ 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*