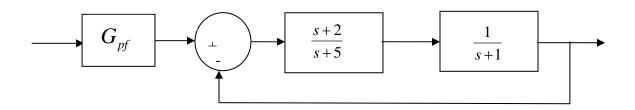
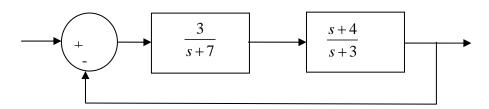
## ECE-320, Quiz #4

Problems 1-3 refer to the following system:



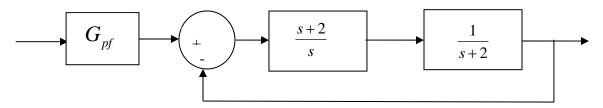
- 1) Assuming the prefilter  $G_{\it pf}$  is 1, the **position error constant**  $K_{\it p}$  is best approximated as
- a) 2/3 b) 2/5 c) 1 d) 0
- 2) Assuming the prefilter  $G_{pf}$  is 1, the steady state error for a unit step is best approximated as
- a) 1/3 b) 5/7 c) 3/5 d) 2/5
- 3) The value of the prefilter  $G_{\it pf}$  that produces a steady state error of zero is:
- a) 1 b) 7/2 c) 5/2 d) 7/5
- 4) For the following system



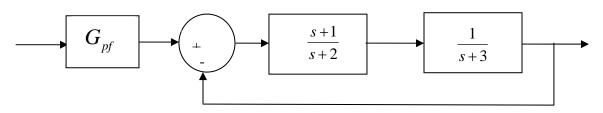
The dynamic prefilter which cancels the closed loop zeros and produces a zero steady state error for a unit step input is

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

Problems 5-7refer to the following system



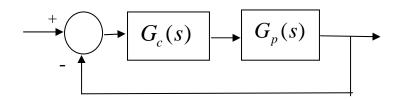
- 5) Assuming the prefilter  $G_{pf}$  is 1, the **velocity error constant**  $K_v$  is best approximated as
- a) 2/3 b) 2/5 c) 1 d) 0
- 6) Assuming the prefilter  $G_{pf}$  is 1, the **steady state error** for a unit ramp input is best approximated as
- a) 1/2 b) 1 c) 2 d) 1/2
- 7) Assuming the prefilter  $G_{pf}$  is 1, the **steady state error** for a unit step input is best approximated as
- a)  $\infty$  b) 0 c) 1 d) 2/5
- 8) Consider the closed loop system below:



If we want to use a dynamic prefilter to **cancel the closed loop zero** and produce a **zero steady state error for a unit step**, we should choose the prefilter as

a) 
$$G_{pf}(s) = \frac{1}{s+1}$$
 b) b)  $G_{pf}(s) = \frac{5}{s+1}$  c)  $G_{pf}(s) = \frac{6}{s+1}$  d)  $G_{pf}(s) = \frac{7}{s+1}$ 

- 9) Is  $G_{pf}(s) = \frac{1}{(s-1)(s+2)}$  an acceptable prefilter (for any system)?
- a) Yes b) No
- 10) For the following system



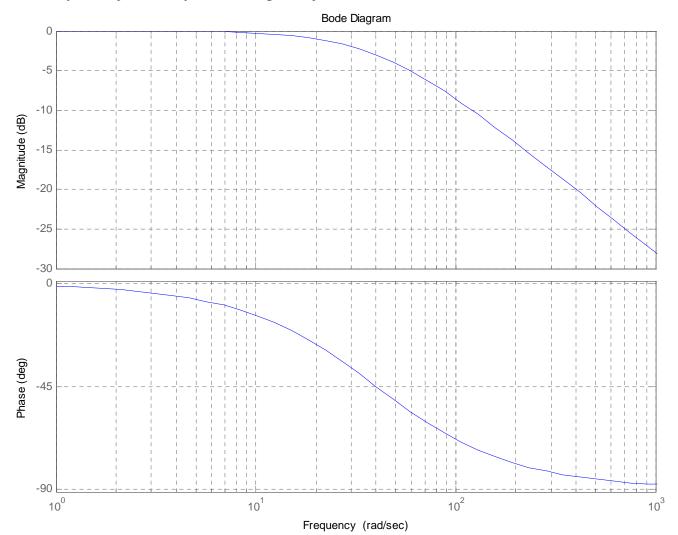
if the plant is  $G_p(s) = \frac{3}{s+2}$  and the desired closed loop transfer function is

 $G_0(s) = \frac{4s+4}{s^2+4s+4}$ , then the required controller is

a) 
$$G_c(s) = \frac{4(s+1)(s+2)}{3s}$$
 b)  $G_c(s) = \frac{(s+2)}{3s^2}$  c)  $G_c(s) = \frac{4(s+1)(s+2)}{3s^2}$  d) none of these

c) 
$$G_c(s) = \frac{4(s+1)(s+2)}{3s^2}$$
 d)

## 11) For a system represented by the following Bode plot,



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

- a)  $\frac{1}{40}$  sec b)  $\frac{4}{20}$  sec c)  $\frac{1}{10}$  sec d) 40 sec e) none of these