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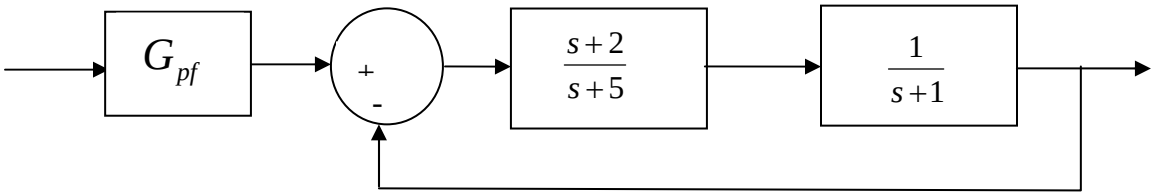
ECE-320, Quiz #4

Problems 1-3 refer to the following system:



1) 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

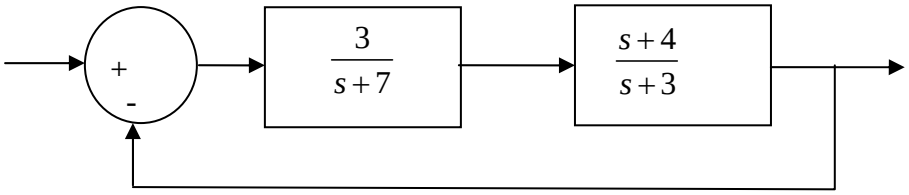
2) Assuming the prefilter G_{pf} is 1, the **steady state error** for a unit step is best approximated as

a) 1/3 b) 5/7 c) 3/5 d) 2/5

3) The value of the prefilter G_{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

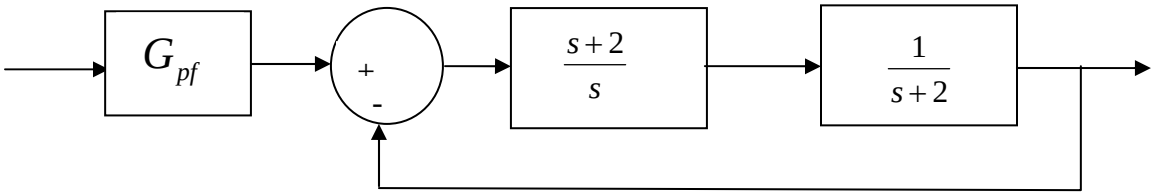


The dynamic prefilter which cancels the closed loop zeros and produces a zero steady state error for a unit step input is

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

Name _____ Mailbox _____

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

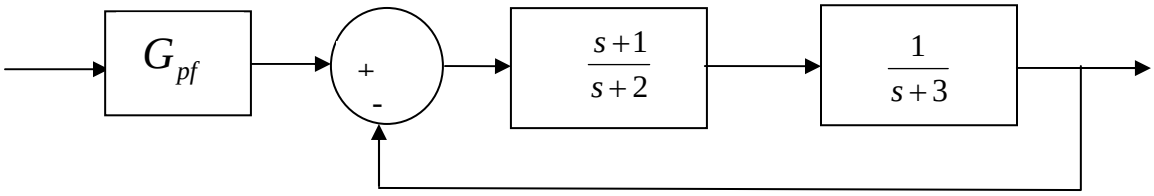
6) Assuming the prefilter G_{pf} is 1, the **steady state error** for a unit ramp input is best approximated as

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) ∞ 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) $G_{pf}(s) = \frac{7}{s+1}$

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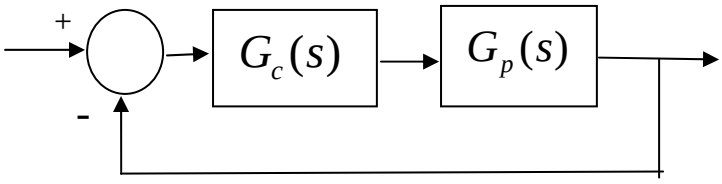
9) Is $G_{pf}(s) = \dfrac{1}{(s-1)(s+2)}$ an acceptable prefilter (for any system)?

a) Yes b) No

10) For the following system



if the plant is $G_p(s) = \dfrac{3}{s+2}$ and the desired closed loop transfer function is $G_0(s) = \dfrac{4s+4}{s^2+4s+4}$, then the required controller is

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

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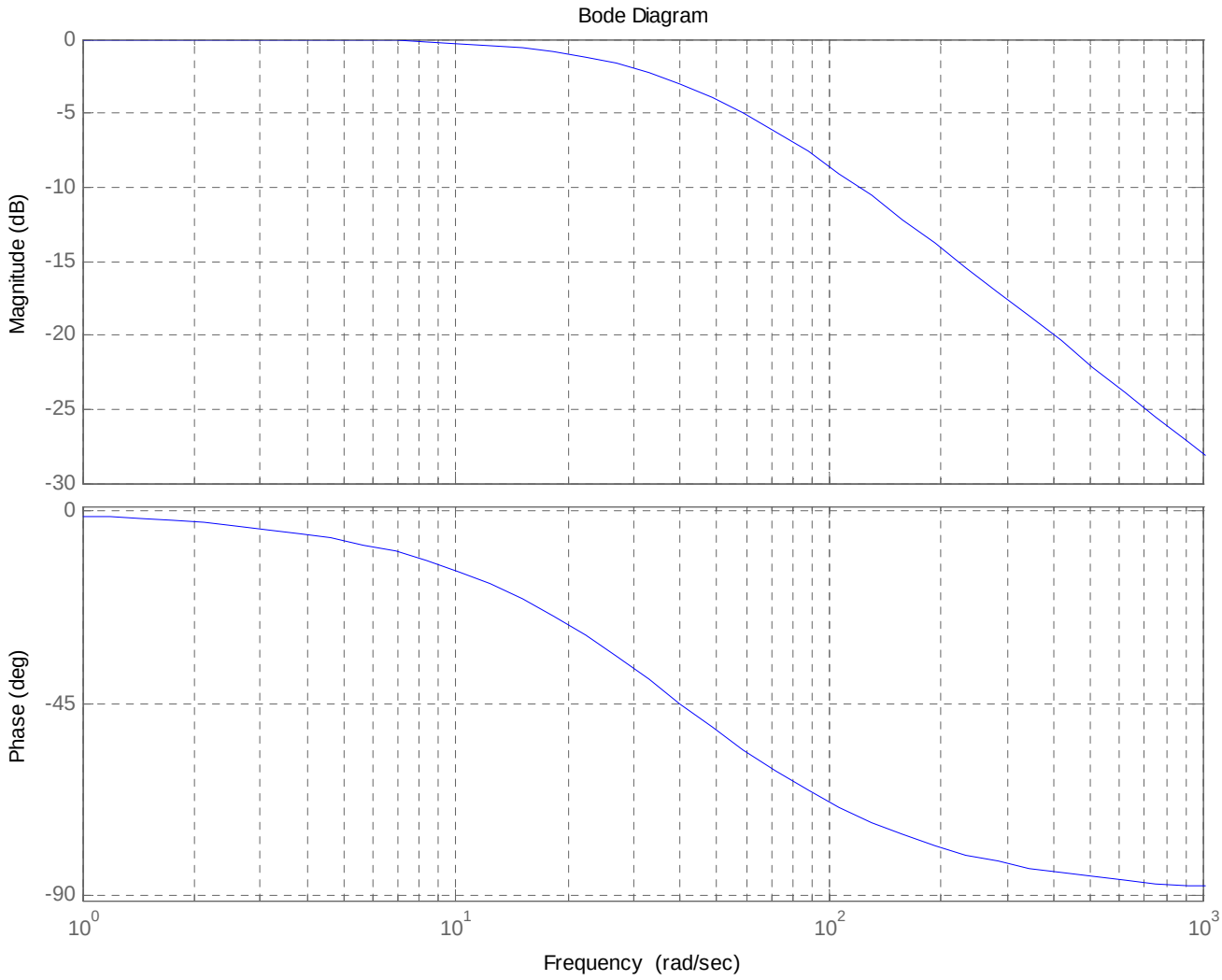
11) For a system represented by the following Bode plot,



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