ECE-320,

Practice Quiz #7

1) Which of the following transfer functions represents an (asymptotically) unstable systems? (circle all of them)

a) $G(z)=\dfrac{z}{z+0.8}$ b) $G(z)=\dfrac{z}{z-0.8}$ c) $G(z)=\dfrac{z}{z+1.2}$ d) $G(z)=\dfrac{z}{z-1.2}$

2) Which of the following systems will have a smaller settling time?

a) $G(z)=\dfrac{z}{z-0.9}$ b) $G(z)=\dfrac{z}{z-0.7}$ c) $G(z)=\dfrac{z}{z+0.5}$ d) $G(z)=\dfrac{z}{z+0.1}$

3) Which of the following systems will have a smaller **settling time?**

a) $G(z)=\dfrac{1}{(z-0.2+j0.2)(z-0.2-j0.2)}$ b) $G(z)=\dfrac{1}{(z-0.1+j0.5)(z-0.1-j0.5)}$ c) $G(z)=\dfrac{1}{(z+0.5)}$

4) Consider a continuous-time system with plant transfer function $G_p(s)=\dfrac{1}{s+2}$. If we sample the system and then convert it to a discrete-time transfer function, the equivalent discrete-time transfer will be

a) $G_p(z)=\dfrac{z}{z-e^{-2T}}$ b) $G_p(z)=\dfrac{z}{z+e^{-2T}}$ c) $G_p(z)=\dfrac{z}{z+e^{+2T}}$ d) $G_p(z)=\dfrac{z}{z-e^{+2T}}$ e) none of these

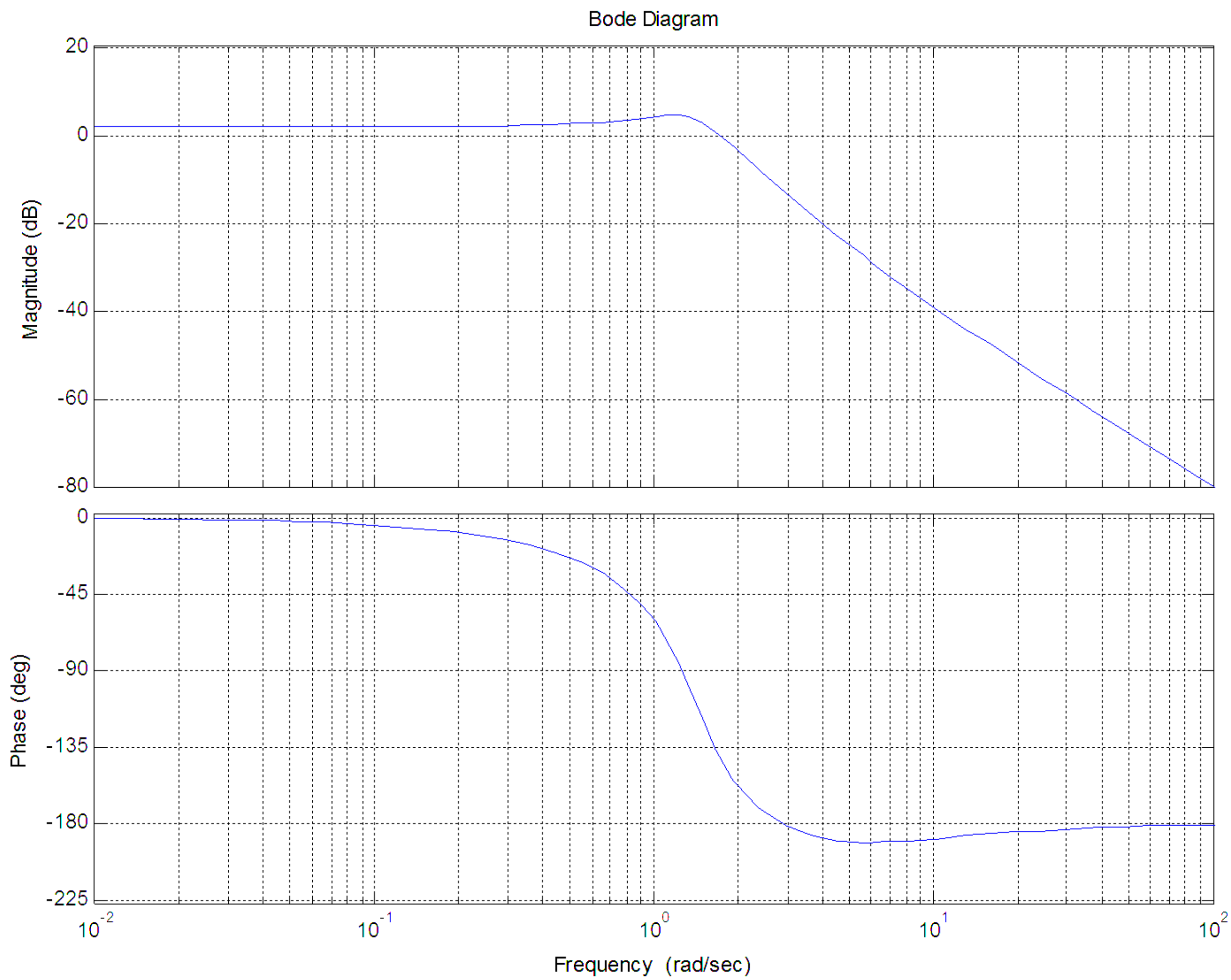
5) Consider a continuous-time stable system with a plant transfer function $G_p(s)$ that is modeled as a discrete-time transfer function $G_p(z)$ assuming a zero order hold. As the sampling interval T gets smaller, the poles of $G_p(z)$

a) move closer to the unit circle (the system becomes less stable)
b) move closer to the origin (the system becomes more stable)
c) do not move

6) Consider a continuous-time system with plant transfer function $G_p(s)=\dfrac{1}{s+1}$. If we mode this system as a discrete-time transfer function $G_p(z)$ assuming a zero order hold, the equivalent transfer function will be

a) $G_p(z)=\dfrac{1-e^{-T}}{z-e^{-T}}$ b) $G_p(z)=\dfrac{1}{z-e^{-T}}$ c) $G_p(z)=\dfrac{z}{z-e^{-T}}$ d) $G_p(z)=\dfrac{z}{z+e^{-T}}$ e) none of these

Problems 7-10 refer to the following open loop Bode plot of $G(s)H(s)$



7**)** The *gain crossover frequency used to determine the phase margin* for this system is best estimated as

a) 0 rad/sec b) 1 rad/sec c) 1.8 rad/sec d) 12 rad/sec e) 100 rad/sec

8) The *phase crossover frequency* for this system is best estimated as

a) 0 rad/sec b) 1.8 rad/sec c) 3 rad/sec d) 30 rad/sec e) 100 rad/sec

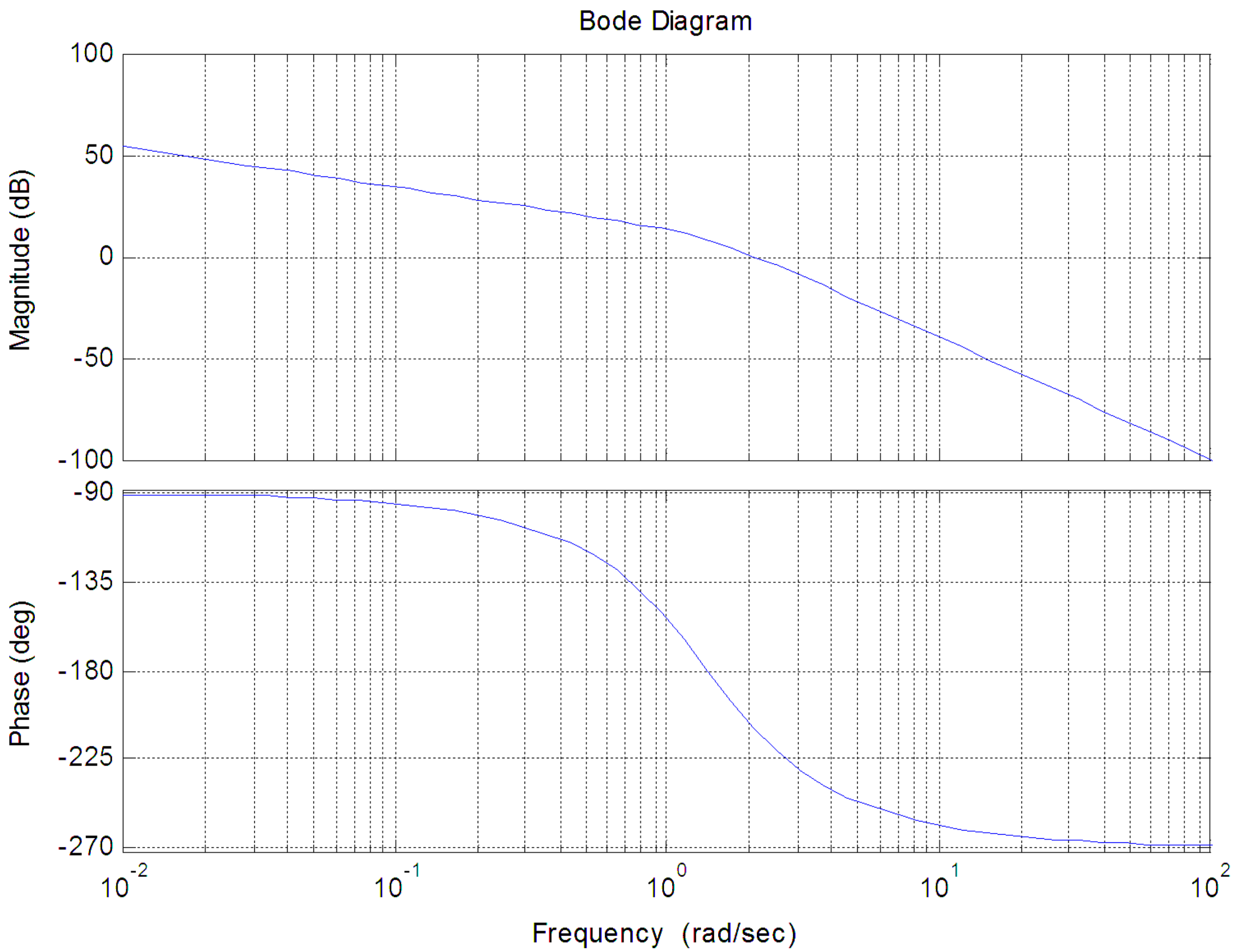
9) The phase margin for this system is best estimated as

a) $+45^o$ b) -45^o c) $+135^o$ d) -135^o

10) The gain margin for this system is best estimated as

a) +12 dB b) - 12 dB c) ∞ dB d) -2 dB

Problems 11-14 refer to the following open loop Bode plot of $G(s)H(s)$



11) The *gain crossover frequency used to determine the phase margin* for this system is best estimated as

a) 0 rad/sec   b) 1 rad/sec   c) 1.5 rad/sec   d) 2 rad/sec   e) 100 rad/sec

12) The *phase crossover frequency* for this system is best estimated as

a) 0 rad/sec   b) 1 rad/sec   c) 1.5 rad/sec   d) 2 rad/sec   e) 100 rad/sec

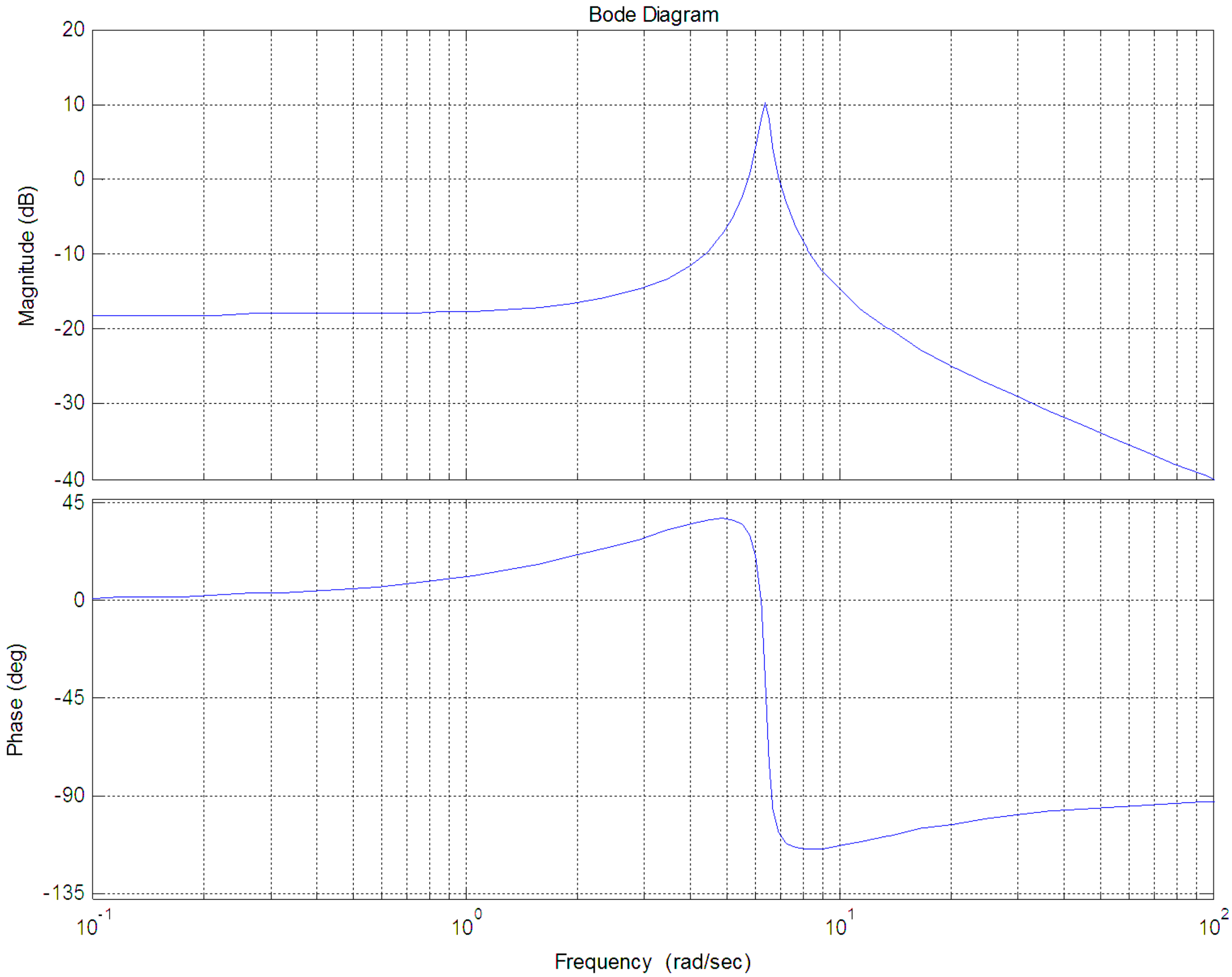
13) The phase margin for this system is best estimated as

a) $+30^o$ b) -30^o c) $+60^o$ d) -60^o

14) The gain margin for this system is best estimated as

a) +5 dB   b) - 5 dB   c) ∞ dB   d) 0 dB

Problems 15-18 refer to the following open loop Bode plot of $G(s)H(s)$



15) The *gain crossover frequency used to determine the phase margin* for this system is best estimated as

a) 0 rad/sec b) 5.5 rad/sec c) 7 rad/sec d) 15 rad/sec

16) The *phase crossover frequency* for this system is best estimated as

a) 0 rad/sec b) 1 rad/sec c) 1.5 rad/sec d) 2 rad/sec e) none of these

17) The phase margin for this system is best estimated as

a) $+70^o$ b) -70^o c) $+135^o$ d) -135^o

18) The gain margin for this system is best estimated as

a) +5 dB b) - 5 dB c) ∞ dB d) 0 dB

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