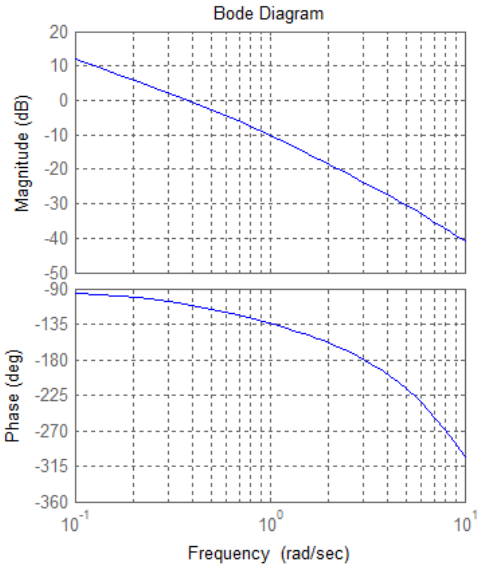
ESE 406/505 & MEAM 513 – 2012-Apr-04 – Quiz – Name:_____

- Choose the one best answer for each question by circling the letter.
- A correct answer is worth 2 points.
- No answer is worth 0 points.
- An incorrect answer is worth -1 point. Random guessing will lower your score, on average.

1. A system is designed with a conservative gain margin of just under 12dB. Which of the following statements is MOST ACCURATE about the closed-loop stability of the actual system?
   A. If the actual gain of the loop transfer function is greater than 12dB at any frequency, the closed-loop system will be unstable.
   B. If the actual gain of the loop transfer function is less than -12dB at any frequency, the closed-loop system will be unstable.
   C. If the actual gain of the system is larger than expected by a factor of 4 or more, the closed-loop system will be unstable.
   D. If the actual gain of the system is smaller than expected by a factor of 4 or more, the closed-loop system will be unstable.

2. In the bode plot shown in the figure at right, the phase margin is approximately...
   A. ...70 deg
   B. ...45 deg
   C. ...1.8 rad/sec
   D. ...0.4 rad/sec



3. The gain margin shown in the figure is approximately...
   A. 36 dB
   B. 24 dB
   C. 9 dB
   D. 3 dB

4. For the loop bode plot shown at right, how much additional time delay in the loop transfer function would cause the closed-loop system to be neutrally stable?
   A. About 3.0 sec.
   B. About 1.6 sec.
   C. About 0.4 sec.
   D. This system cannot be made unstable with additional time delay.

5. The frequency response shown at right matches which of the following transfer functions?
   A. $\frac{9s+9}{s+9}$
   B. $\frac{s+9}{9s+9}$
   C. $\frac{9s}{s+9}$
   D. $\frac{s+9}{s}$