

Name _____

Circle one: Section 0810 0910

ME 422 – Quiz 4

Fall 2011

In giving your answer, the answer alone is not enough. Make sure you clearly give your rationale for arriving at the answer. It must be clear to me how you arrive at your answer.

Weights: Problem 1 =70%, Problem 2 = 30%

1. In the lab this week you devised a single-tank controller with $K_p = 0.6$ and $K_I = 0.005$. On the sheet provided, construct the Bode plot of this controller. You need only to use the asymptotes of the components—i.e., don't worry about the real curves. Your plot should include:
 - a) Scaling with values for all vertical and horizontal axes
 - b) Clearly marked ω axes
 - c) Locations of any important frequencies
 - d) All component asymptotes (log mag and phase) as dashed lines, each labelled to show what component it belongs to
 - e) The composite asymptotes for log mag and phase for the controller, drawn as solid lines

See problem 2 on next page...

2. On the Bode plot of an open-loop system shown below, clearly show ω_{GM} , $\omega_{\phi M}$, G_M , and Φ_M . Give approximate values for each of these quantities. Determine the value of K that, if added to this system, would drive it to the limit of stability.

