



The Bode Diagram above shows the frequency response of an open loop plant (solid line) and a compensator (dashed line) to be used in a unity negative feedback control loop as shown.

- Using the frequency response plot above, determine the relative degree of the plant. Explain your answer. (10 pts)
- Using the frequency response plot above, determine the relative degree of the compensator. Explain your answer. (10 pts)
- Accurately sketch the open loop transfer function phase angle on the frequency response plot. (30 pts)
- Accurately sketch the open loop transfer function magnitude on the magnitude response plot. (30 pts)
- On the open loop transfer function you sketched in problems (c) and (d), estimate values for and label the gain crossover frequency, the phase crossover frequency, the gain margin, and the phase margin. Is the closed-loop system stable? Explain your answer. (15 pts)
- Based on the frequency response plot, what type(s) of reference input command to the closed-loop system (step, ramp, parabolic, etc.) are guaranteed to have zero steady-state tracking error? Explain your answer. (5 pts)