

# Homework #9: ECE 461/661

Meeting design specs, Delays, Lightly Damped Systems. Due Monday, November 5, 2018

Problem 1: Delays. Assume you have a system with a 200ms delay:

$$G(s) = \left( \frac{200}{(s+2)(s+5)(s+10)(s+15)} \right) \cdot e^{-0.2s}$$

Design a compensator which results in the closed-loop system having

- 20% overshoot for a step input.
- No error for a step input, and
- A 2% settling time of 4 seconds
- Design an op-amp circuit to implement  $K(s)$
- Determine the dominant poles of the closed-loop system
- Plot the step response of the closed-loop system using VisSim (or similar program)

Problem 2: Lightly Damped Systems: Assume you have a system which is lightly damped:

$$G(s) = \left( \frac{200}{(s+2)(s+j4)(s-j4)} \right)$$

Design a compensator which results in the closed-loop system having

- 20% overshoot for a step input.
- No error for a step input, and
- A 2% settling time of 4 seconds
- Determine the dominant poles of the closed-loop system
- Plot the step response of the closed-loop system using VisSim (or similar program)
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