# Homework #10: ECE 461/661

Digital PID Control. Due Monday, November 16th

PID Control

Assume T = 0.5 seconds:

$$G(s) = \left( \frac{1.4427}{(s+0.1617)(s+1.04)(s+2.719)(s+5.05)} \right)$$

1) Design a digital I controller

$$K(s) = k\left( \frac{z}{z-1} \right)$$

that results in 20% overshoot in the step response.

Simulate the step response of the closed-loop system (VisSim or Simulink preferred with K(z)*G(s))

2) Design a digital PI controller

$$K(s) = k\left( \frac{z-a}{z-1} \right)$$

that results in 20% overshoot in the step response.

Simulate the step response of the closed-loop system (VisSim or Simulink preferred with K(z)*G(s))

3) Design a digital PID controller

$$K(s) = k\left( \frac{(z-a)(z-b)}{z(z-1)} \right)$$

that results in 20% overshoot in the step response.

Simulate the step response of the closed-loop system (VisSim or Simulink preferred with K(z)*G(s))

## Meeting Design Specs

4) Design a digital controller with T = 0.5 seconds that results in

- No error for a step input
- 20% overshoot for the step response, and
- A 2% settling time of 10 seconds

Simulate the step response of the closed-loop system (VisSim or Simulink preferred with K(z)*G(s))

5) Design a digital controller with T = 0.1 second that results in

- No error for a step input
- 20% overshoot for the step response, and
- A 2% settling time of 10 seconds

Simulate the step response of the closed-loop system (VisSim or Simulink preferred with K(z)*G(s))