Tutorial 2
Control, System…Control

Objective of this tutorial is to improve your understanding of developing a controller for achieving performance metrics with a closed loop controller.

Perform all the programming steps in a single file named **<roll_number>_T2.m** and submit that. Submit a PDF for written components showing your calc.

1. Consider the unity feedback system with a compensator C(s) and the plant

$$G(s) = \frac{K}{(s+5)^3}$$

   a. Find the location of the dominant poles to yield a 1.2 second settling time and an overshoot of 15%.
   b. If a compensator with a zero at -1 is used to achieve the conditions of Part a, what must the angular contribution of the compensator pole be?
   c. Find the location of the compensator pole.
   d. Find the gain required to meet the requirements stated in Part a.
   e. Find the location of other closed-loop poles for the compensated system.
   f. Discuss the validity of your second-order approximation.

2. A unity feedback control system has the following forward transfer function:

$$G(s) = \frac{K}{s^2(s+5)(s+15)}$$

   a. Design a lead compensator to yield a closed-loop step response with 20.5% overshoot and a settling time of 3 seconds. Be sure to specify the value of K.
   b. Is your second-order approximation valid?