Homework #11

2. The unity feedback system with $G(s) = K/(s+1)(s+3)(s+5)$ is operating with 10% overshoot.

a. What is the appropriate static error constant?
b. Design a lag compensator so that the appropriate static error constant equals 4 without appreciably changing the dominant poles of the uncompensated system.
c. Use MatLab to simulate the results.

13. Given $G(s) = K/(s+2)(s+4)(s+6)(s+8)$,

Find the transfer function of a lead-lag that will yield a settling time of 0.5s shorter than the uncompensated system, with a damping ration of 0.5, and improve the stead-state error by a factor of 30. The compensator zero should be placed at –5. Also, find the compensated system's gain. Justify second-order approximations and verify via simulation.

20. Using $G(s) = K/(s+3)(s+5)$ **without using MatLab,**

a. Show that the system cannot operate with a settling time of 2/3 second and a percent overshoot of 1.5% with a simple gain adjustment.
b. Design a lead compensator so that system meets the requirements of a. Specify the pole, zero and required gain.

21. Given $G(s) = K/(s+1)(s+4)$,

Design a PID controller to yield a peak time of 1.047s and a damping ratio n0f 0.8 with zero error for a step input.