1) A unity feedback system is shown below. Design the proportional ($K_1$ only) controller such that the system operates with a dominant pole damping ratio of 0.707. Add the derivative term ($K_3$) such that the settling time is reduced by a factor of 2.

2) Simulate both of the systems designed above (one with P control only, other with PD control) with Simulink™.

3) A unity feedback system is shown below. Design a PID controller such that the system operates with a settling time of 2/3 second, 1.5% overshoot, and zero steady-state error for a step input. Simulate the system with your PID controller using Simulink™.

4) Work Problem #17 (p. 518) of your text. Simulate only the compensated (with lead compensator/controller) system using Simulink™.

5) Use the techniques of section 9.6 of your text to design a realistic physical implementation (resistors, capacitors, etc.) for each of the controllers design in problems #1, #3, and #4 above.