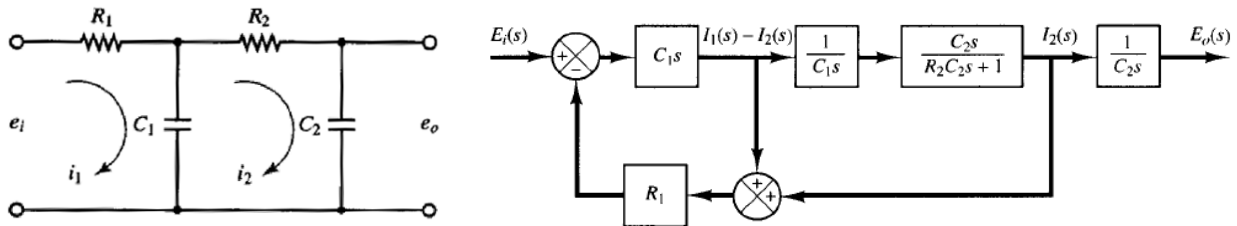
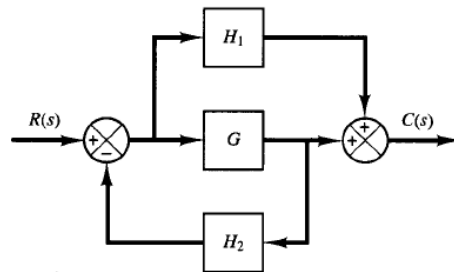


Problem Set #5 Due February 25, 2011

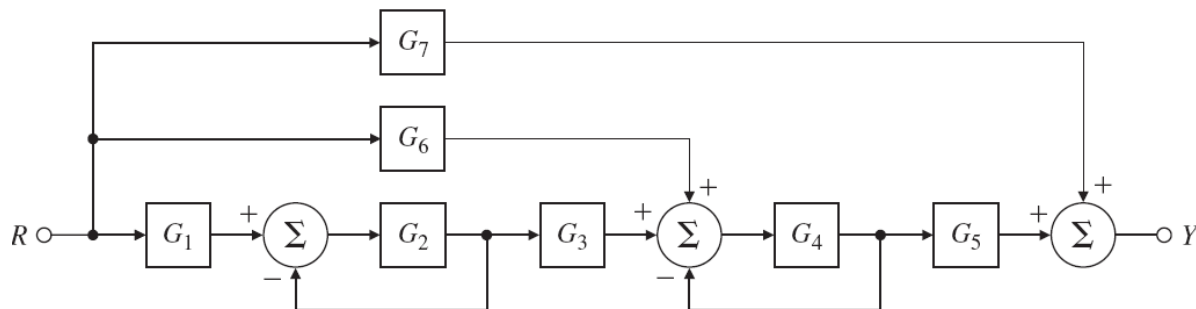
1. For the RC-RC electrical system, show that the block diagram correctly represents the mathematical model (i.e., differential equations) for the system, i.e., compare the mathematical model determined from analysis (first principles / impedance) to the mathematical model represented by the block diagram. Then simplify the block diagram to obtain the transfer function between e_i / e_o . Show all steps in the block-diagram reduction.



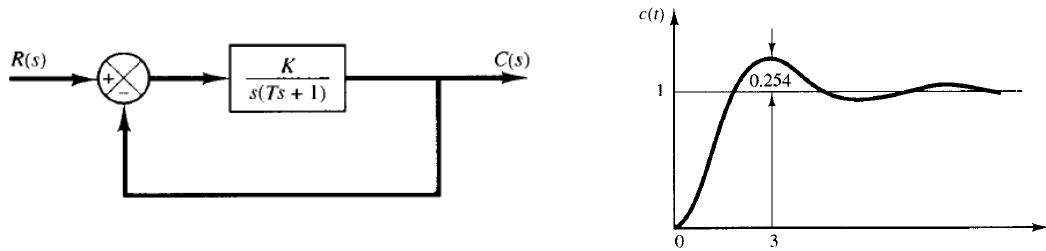
2. Simplify the block diagram shown to obtain the transfer function C/R .



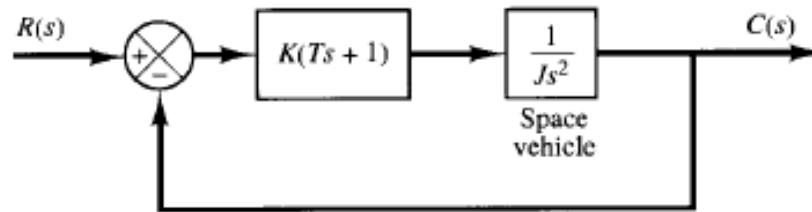
3. Simplify the block diagram shown to obtain the transfer function Y/R .



4. When the system shown is subjected a unit step input, the system output responds as shown. Determine the values of K and T .



5. The diagram is a block diagram of a space-vehicle attitude-control system. Assuming that $T = 3$ seconds and $K/J = 0.222$, find the damping ratio of the system.



6. For the system shown, determine the values of K and k such that the system has a damping ratio of 0.7 and an undamped natural frequency of 4 rad/s.

