(1), (3), (4) Simplify to a single block $C(s)/R(s)$.

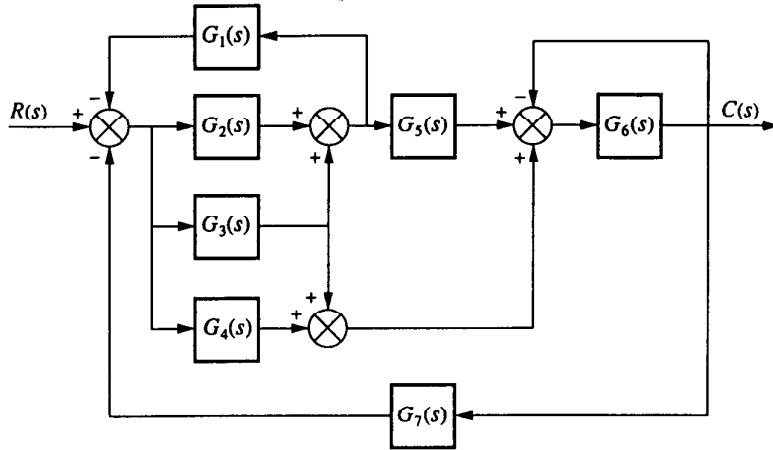Figure P5.1

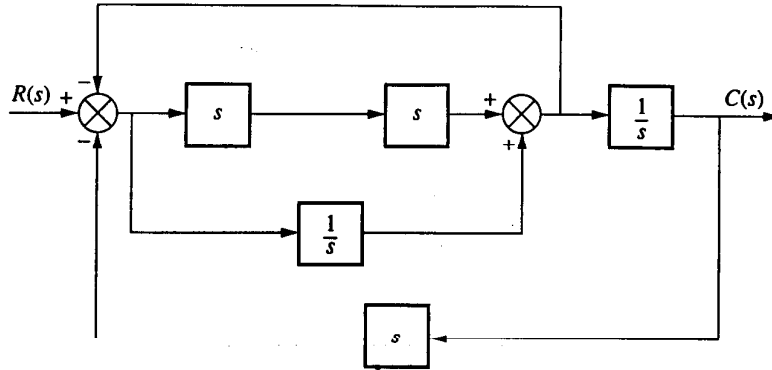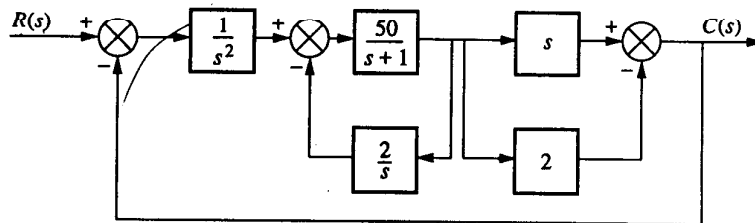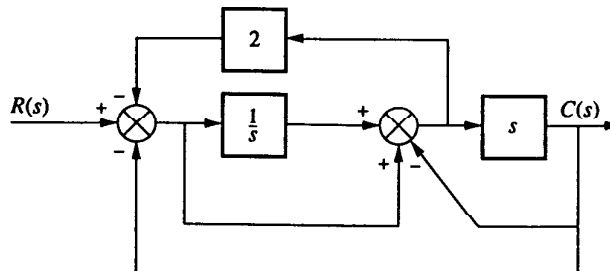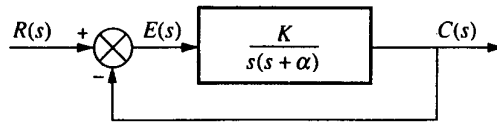Figure P5.3

P5.4

13. For the system shown in Figure P5.13, find the poles of the closed-loop transfer function, $T(s) = C(s)/R(s)$.

Figure P5.13

15. For the system shown in Figure P5.15, find K and α to yield a settling time of 0.5 second and a 40% overshoot.

Figure P5.15

52. Assume that the motor whose transfer function is shown in Figure P5.36(a) is used as the forward path of a closed-loop, unity-feedback system.

a. Calculate the percent overshoot and settling time that could be expected.

b. You want to improve the response found in part (a). Since the motor and the motor constants cannot be changed, an amplifier and a tachometer (voltage generator) are inserted into the loop, as shown in Figure P5.36(b). Find the values of K_1 and K_2 to yield a 25% overshoot and a settling time of 0.2 second.

Figure P5.36
a. Position control;
b. position control
with tachometer

(a)

(b)