ELEC 312 - Systems I
Homework Assignment 6

Due Wednesday, April 1, 2015 for Section 01
Due Wednesday, April 1, 2015 for Section 81

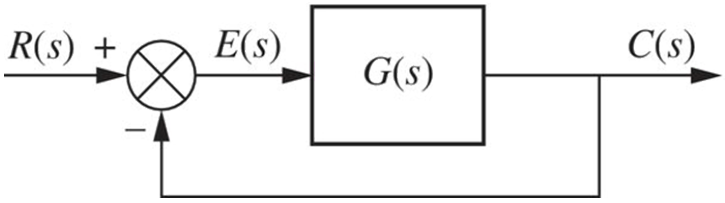

Figure P7.1

1. Chapter 7, Problem 10, *Control Systems Engineering*:
   For the unity feedback system shown in Figure P7.1 (above), where

$$G(s) = \frac{5000}{s(s+75)}$$

   (a) What is the expected percent overshoot for a unit step input?
   (b) What is the settling time for a unit step input?
   (c) What is the steady-state error for an input of $5u(t)$?
   (d) What is the steady-state error for an input of $5tu(t)$?
   (e) What is the steady-state error for an input of $5t^2u(t)$?

2. Chapter 7, Problem 22, *Control Systems Engineering*:
   The unity feedback system of Figure P7.1 (above), where

$$G(s) = \frac{K\,(s^2+3s+30)}{s^n(s+5)}$$

   is to have 1/6000 error between an input of $10tu(t)$ and the output in the steady state.
   (a) Find K and n to meet the specification.
   (b) What are K_p, K_v, and K_a?

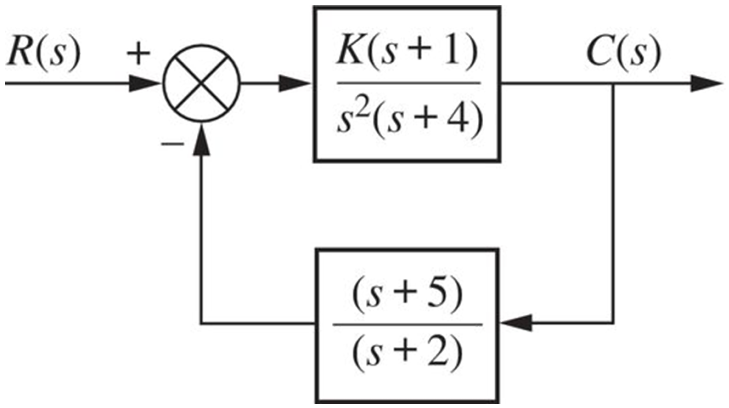

Figure P7.20

3. Chapter 7, Problem 45, *Control Systems Engineering*:
   For the system shown in Figure P7.20 (above),

   (a) What is the system type?

   (b) What is the appropriate static error constant?

   (c) What is the value of the appropriate static error constant?

   (d) What is the steady-state error for a unit step input?