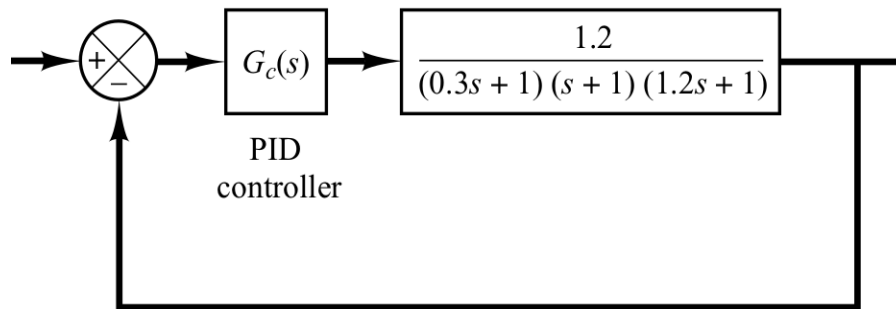




Homework-5

1. Consider the closed-loop system shown below, assume the PID control is given by $G_c(S)$. It is desired that the unit-step response of the system exhibit the maximum overshoot of less than 10%, but more than 2% (to avoid an almost overdamped system), and the settling time be less than 2 sec. Write a matlab/simulink code that will satisfy the given specifications. Choose $dt = 0.05s$. Also display the input and output responses (on a same figure).



2. Consider the following characteristic equation:

$$s^4 + 2s^3 + (4 + K)s^2 + 9s + 25 = 0 \quad (1)$$

using the Routh stability criteria, determine the range of K for stability.

3. Consider the system described by

$$\ddot{y} + 3\dot{y} + 2y = u. \quad (2)$$

Derive the state-space representation of the system.