Homework 3

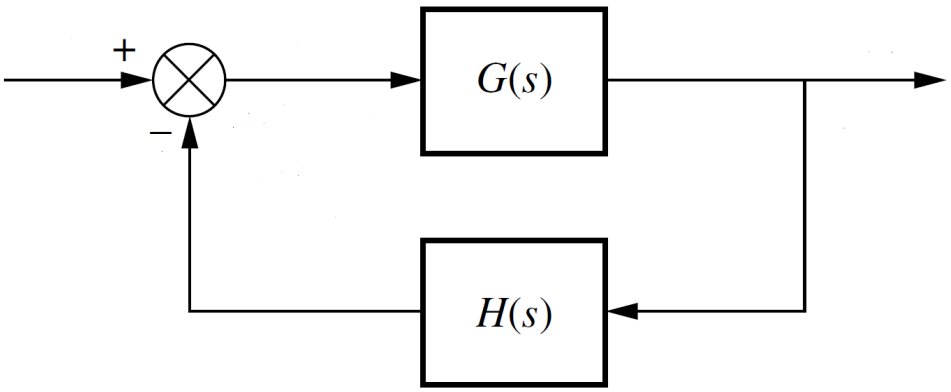

Figure 1: Control System

1. Consider the control system in Figure 1 with

$$G(s) = \frac{s+2}{(s+1)(s^2+2s+25)} \qquad H(s) = 1$$

   Draw the asymptotic Bode plot.

2. Consider the control system in Figure 1 with

$$G(s) = \frac{K}{(s+1)(s+4)(s+6)} \qquad H(s) = 1$$

   a) Draw the Nyquist plot.

   b) By using this plot, find the range of K for BIBO stability.

3. Consider the control system in Figure 1 with

$$G(s) = \frac{K}{s(s+10)(s+40)} \qquad H(s) = 1$$

   a) Draw the asymptotic Bode plot.

   b) By using this plot, find the range of K for BIBO stability.

4. Consider the control system in Figure 1 with

$$G(s) = \frac{4}{(s+2)(s^2+2s+2)} \qquad H(s) = 1$$

   Find the gain margin and the phase margin of this system.

5. Consider a lag compensator which reduces the velocity error constant by factor 20. Draw the asymptotic Bode plot of this compensator.