Exercise 6

System 1:

$$G(s) = \frac{1}{s^2 + 10s + 20}$$

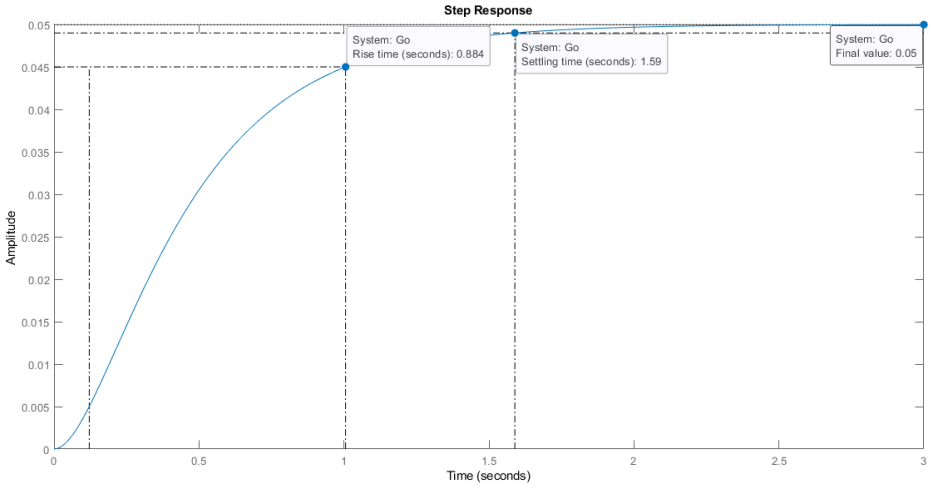

Figure 1. Step Response for Open Loop System without any Controller

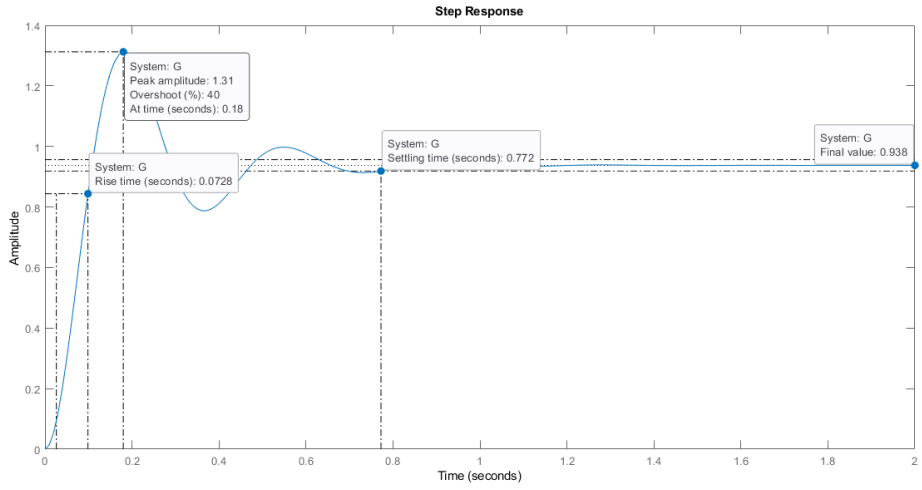

Figure 2. Step Response with P-Controller

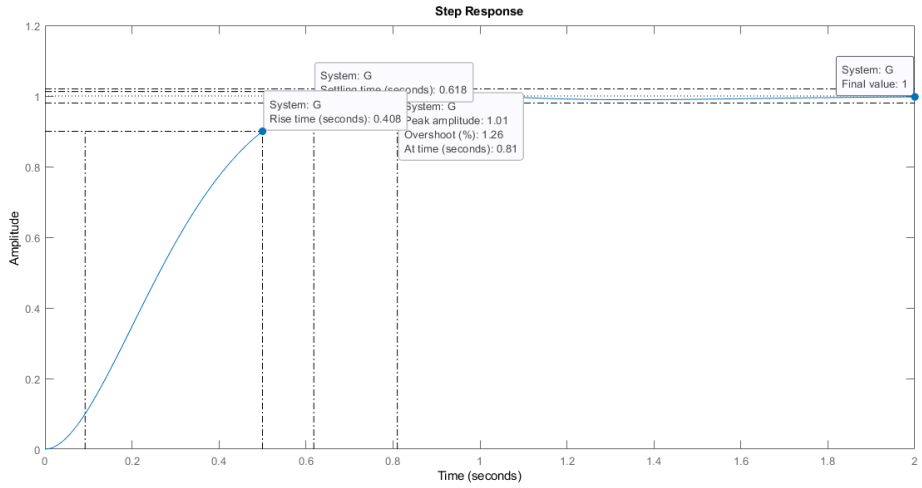

Figure 3. Step Response with PI-Controller

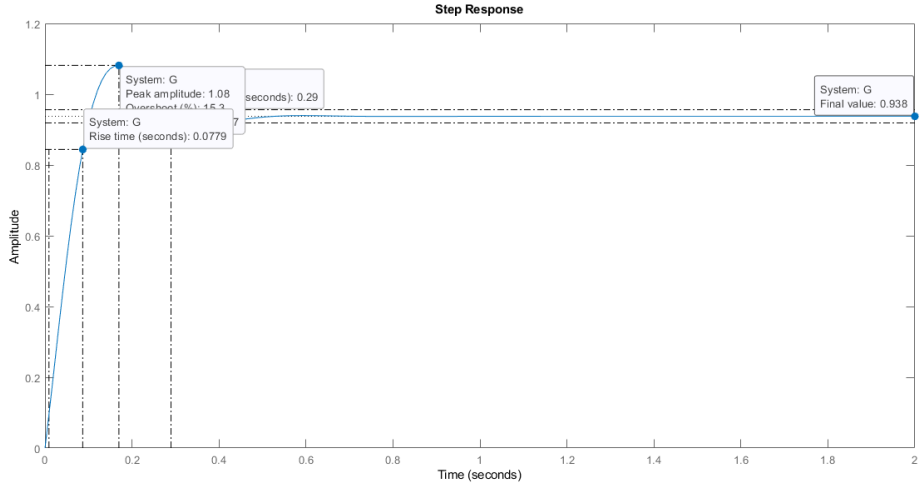

Figure 4. Step Response with PD-Controller

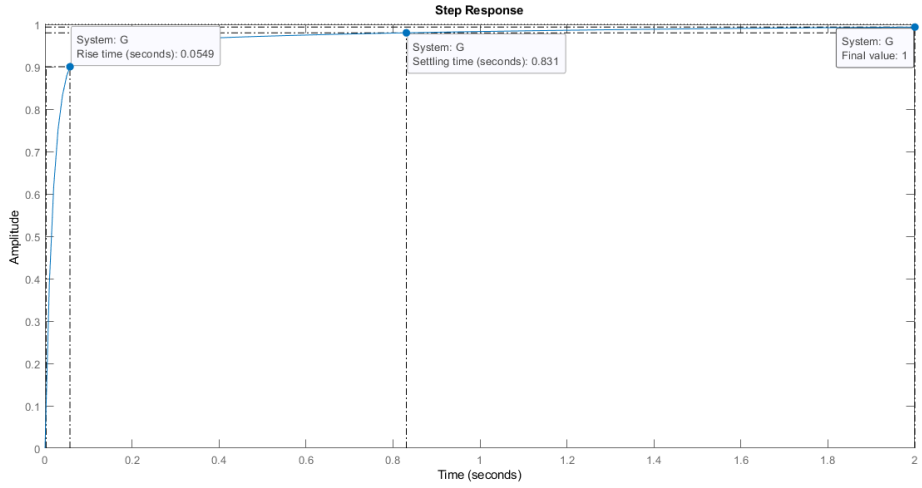

Figure 5. Step Response with PID-Controller

Controller Performance Metrics:

Controller	Rise Time (s)	Overshoot (%)	Settling Time (s)	Steady-State Error
P	0.0728	40.0	0.772	0.062
PI	0.4080	1.26	0.618	0.000
PD	0.0779	15.3	0.290	0.062
PID	0.0549	-	0.831	0.000

System 2:

$$G(s) = \frac{100}{(s+1)(s+2)(s+10)}$$

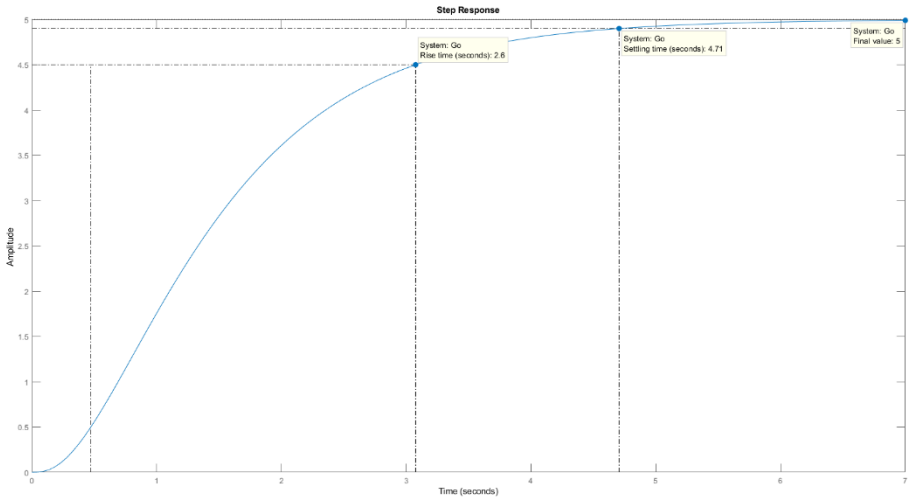

Figure 6. Step Response for Open Loop System without any Controller

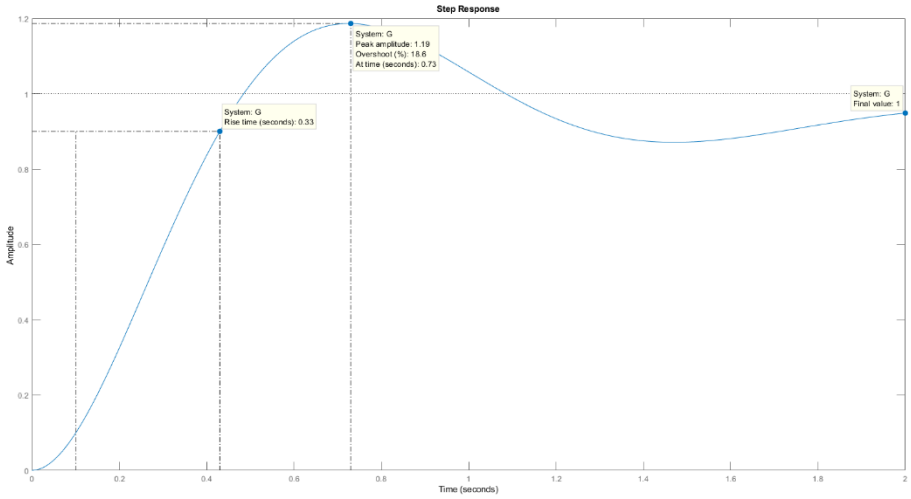

Figure 7. Step Response with PID-Controller