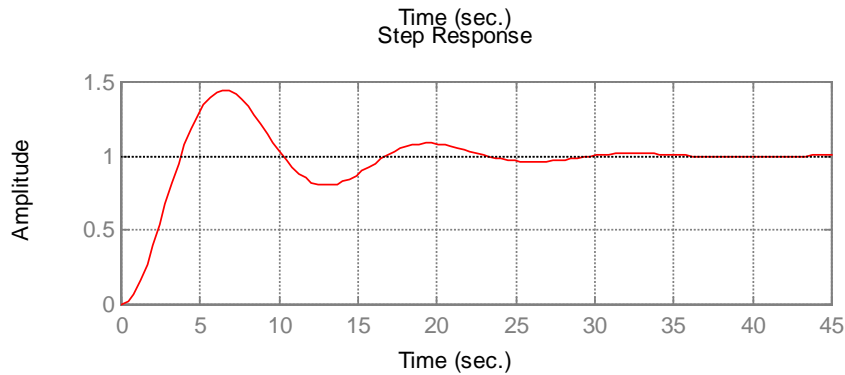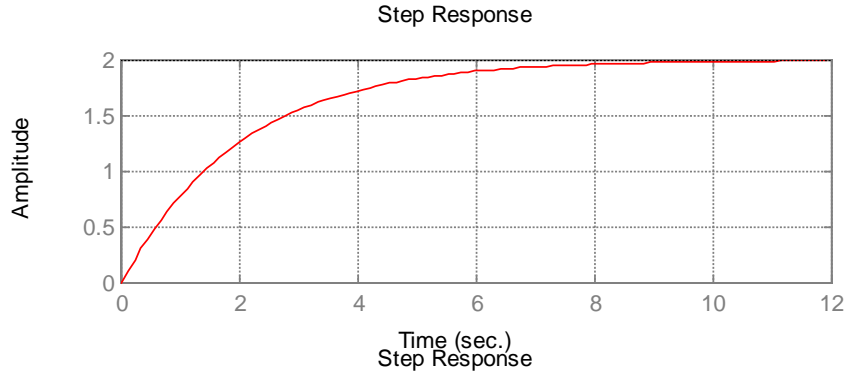System Response:

1. Sketch the response of each of the systems below to a step input.

a) $H(s) = \dfrac{10}{s+2}$

b) $H(s) = \dfrac{0.2}{s+0.2}$

2. Given, the two step responses shown below, the first one is a first order system and the second one is a second order system. Determine the transfer functions for both systems.

3. Plot the pole positions for each of the following systems, determine the values for ζ and ω_n for the stable second order systems with complex poles.

a) $H(s) = \dfrac{1}{s+4}$

b) $H(s) = \dfrac{1}{s+10}$

c) $H(s) = \dfrac{1}{s-2}$

d) $H(s) = \dfrac{1}{s^2+4s+16}$

e) $H(s) = \dfrac{1}{s^2+4s+3}$

f) $H(s) = \dfrac{1}{s^2+4s+2}$

g) $H(s) = \dfrac{1}{s^2-4s+16}$

4. Give the general form of the response of the systems in Problem 3 to a step input.

5. Determine the steady-state response of the systems in Problem 3 a), d), and f) to an input of $x(t) = 2\cos(4t-20^\circ)u(t)$.

6. Given the following system:

$$H(s) = \frac{10}{s^2 + 10s + 100}$$

a) Plot the poles. Identify the values of ω_n and ζ.
b) Sketch the step response.
c) What is the steady-state response of the system to the following input?

$$x(t) = \cos(10t)u(t)$$