

ELEC 312 - Systems I

Homework Assignment 3

Due Monday, February 23, 2015 for Section 01

Due Monday, February 23, 2015 for Section 81

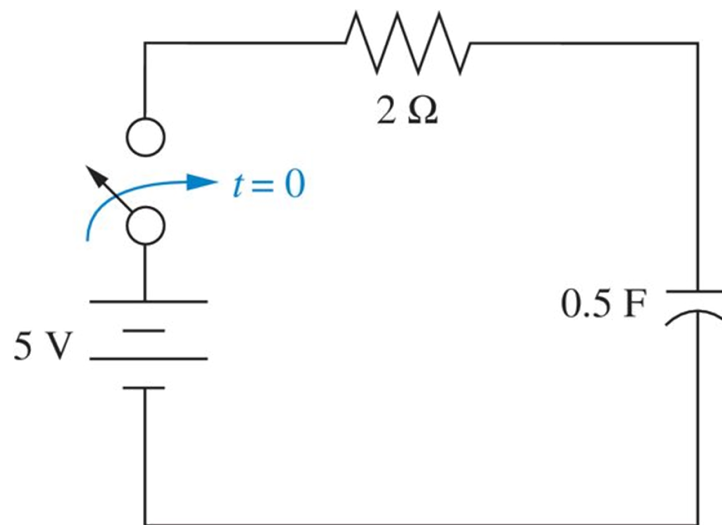


Figure P4.2

1. Chapter 4, Problem 4, *Control Systems Engineering*:

Find the capacitor voltage in the network shown in Figure P4.2 if the switch closes at $t = 0$. Assume zero initial conditions. Also find the time constant, rise time, and settling time for the capacitor voltage.

2. Chapter 5, Problem 4, *Control Systems Engineering*:

Plot the step response for Chapter 4, Problem 4, *Control Systems Engineering* (above) using MATLAB. From your plots, find the time constant, rise time, and settling.

3. Chapter 4, Problem 20(a), *Control Systems Engineering*:

For the second-order system that follows, find ζ , ω_n , T_s , T_p , T_r , and %OS.

$$T(s) = \frac{16}{s^2 + 3s + 16}$$

4. Chapter 5, Problem 22(a), *Control Systems Engineering*:

Plot the step response for Chapter 4, Problem 20(a), *Control Systems Engineering* (above) using MATLAB. From your plot, find settling time, peak time, rise time, and percent overshoot.

5. Chapter 4, Problem 24, *Control Systems Engineering*:

Find the transfer function of a second-order system that yields a 15% overshoot and a settling time of 0.7 second.

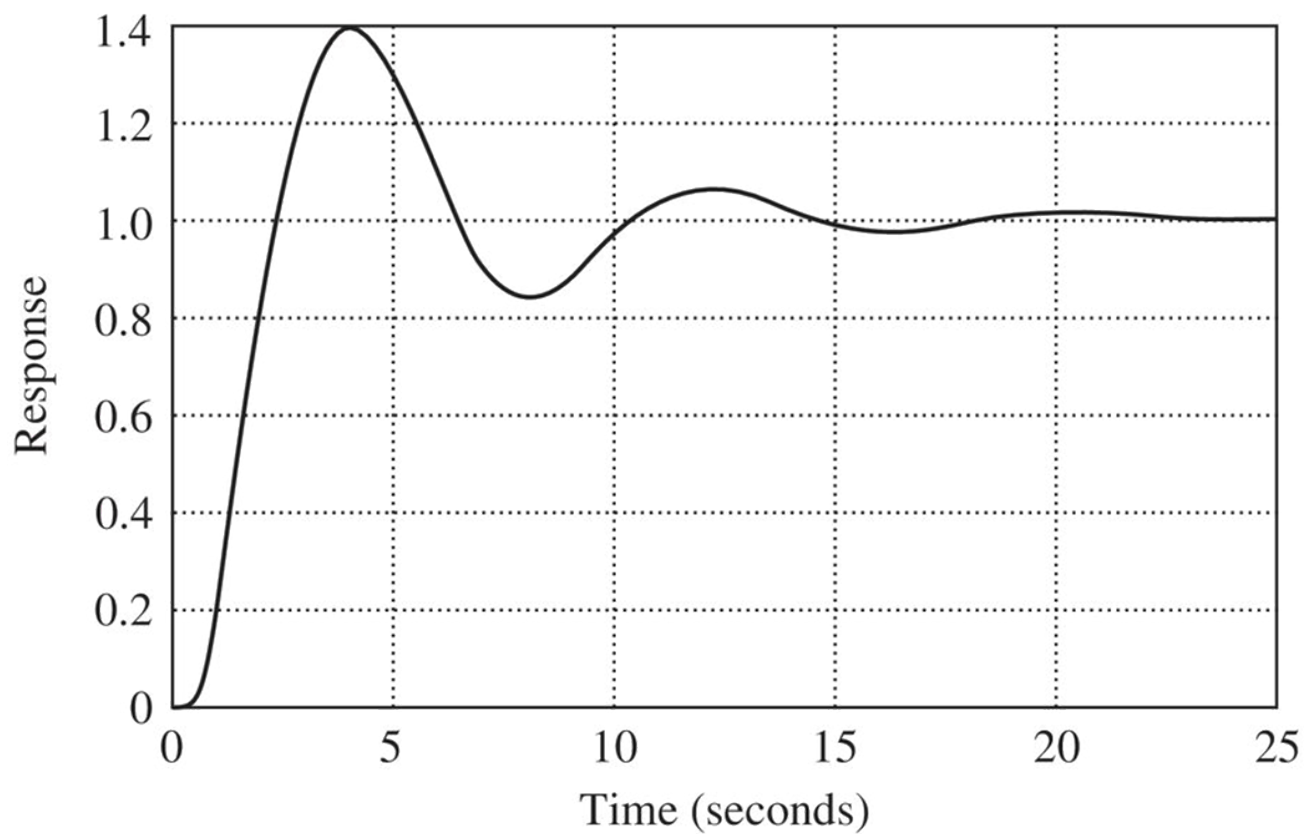


Figure P4.10(c)

6. Chapter 4, Problem 32(c), *Control Systems Engineering*:

For the step response shown in Figure P4.10(c), find the transfer function of the system. [Hint: The peak time is at 4 seconds.]