Due 5/10 at 3:00PM on Gradescope

Please write your answers in the boxes provided for Part 2.

You are not required to submit the solutions to Part 1.

Part 1 (Practice Problems):

Q1. Problem 4.36 from book

Real inductors have series resistance associated with the wire used to wind the coil. Suppose that we want to store energy in a 10-H inductor. Determine the limit on the series resistance so the energy remaining after one hour is at least 75 percent of the initial energy.

Q2. Problem 4.27 from book

The circuit in Figure P4.27 has been connected for a very long time. Determine the values of Vc and iR.

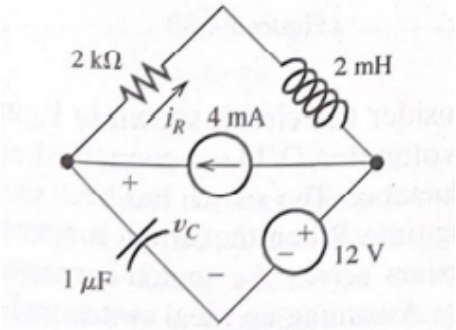


Figure P4.27

Q3. Problem 4.21 from book

Solve for the steady-state values of i1, i2, and i3 for the circuit shown in Figure P4.21.

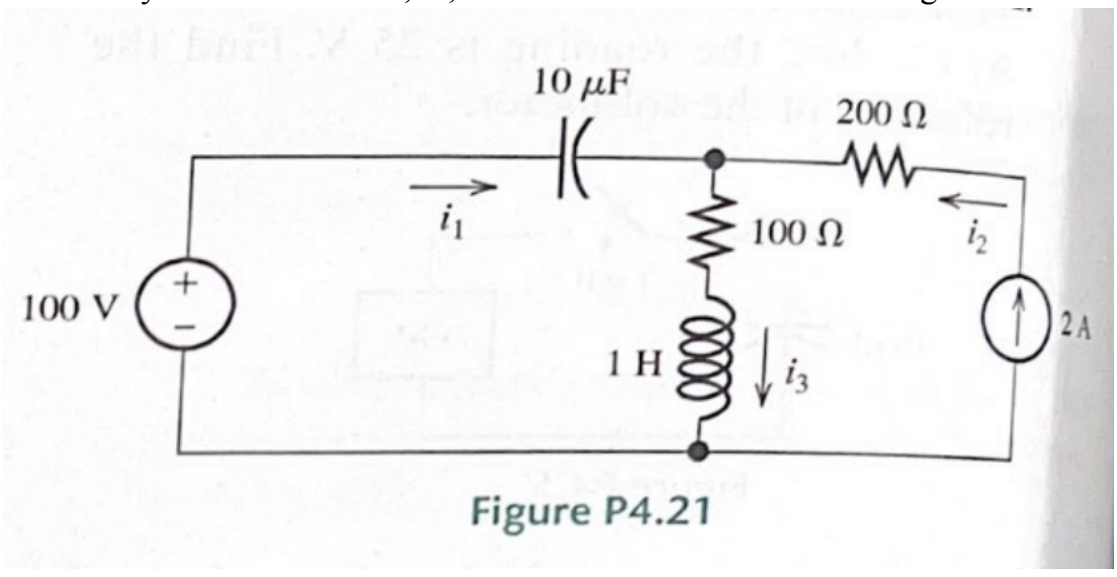


Figure P4.21

Q4. Problem 4.61 from book

A DC source is connected to a series RLC circuit by a switch that closes at t = 0, as shown in Figure P4.61. The initial conditions are i(0+) = 0 and Vc(0+) = 0. Write the differential equation for Vc(t). Solve for Vc(t), if R = 80Ω.

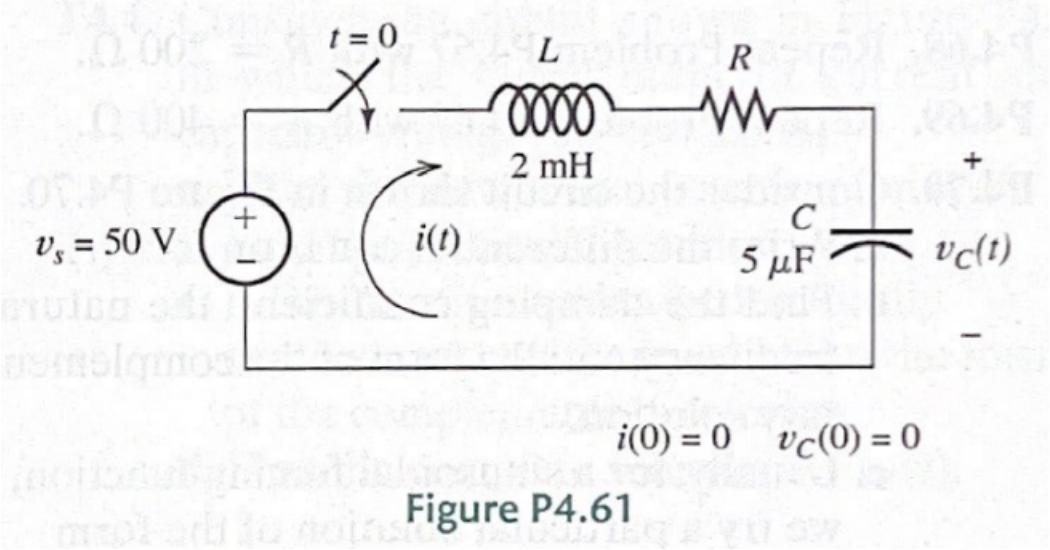


Figure P4.61

Part 2 (Graded)

Q1. Problem 4.42 from book
The switch shown in Figure P4.42 has been closed for a long time prior to t=0, then it opens at t=0 and closes again at t=1 s. Find $i_L(t)$ for all t. (5 points)

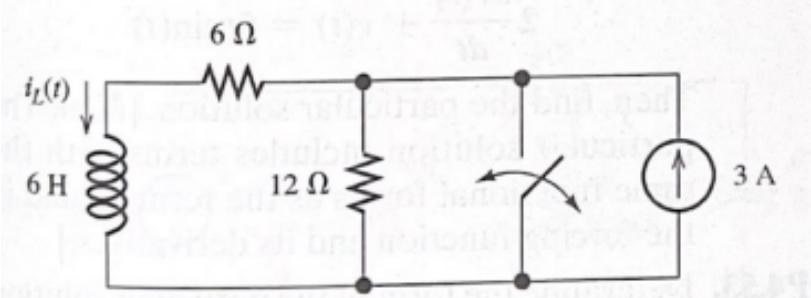


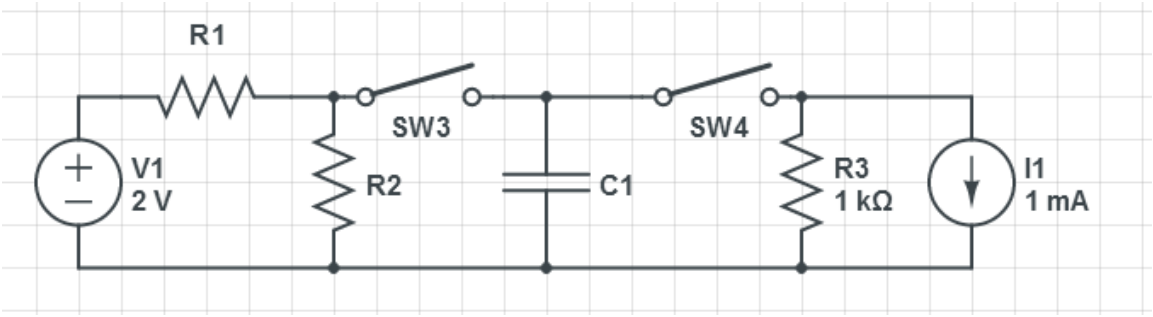
Figure P4.42

$i_L(t)$=

Q2. In the circuit below switch SW3 was closed and SW4 was open prior to t=0. Switch SW3 was opened at t=0 and SW4 was closed at t=0. It was found that the change in capacitor voltage between t=0 & t=∞ was 1.5 V.

a. What is R1/R2 (3 points)

b. Now suppose SW3 was also closed after the circuit reached steady state. It was found that current through R1 is 3 mA just after closing SW3. Find R1 & R2 (2 points)



a.$R1/R2$ =
b.$R1$ =
b.$R2$ =

Q3. Problem 4.63 from book

A DC source is connected to a series RLC circuit by a switch that closes at t = 0, as shown in Figure P4.61. The initial conditions are $i(0+) = 0$ and $v_C(0+) = 0$. Write the differential equation for $v_C(t)$ if R = 20Ω. (5 points)

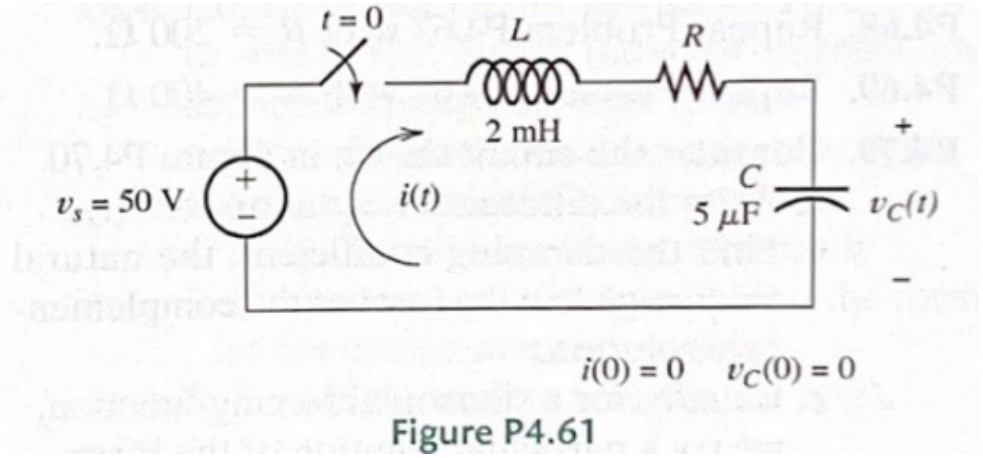
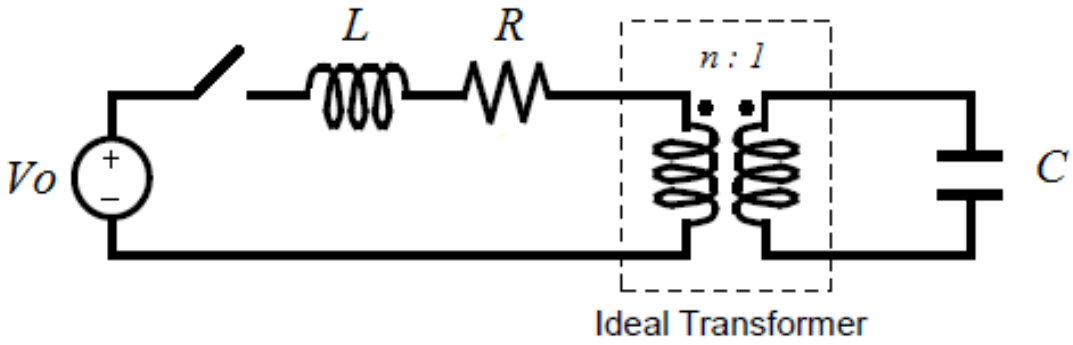


Figure P4.61

$v_C(t) =$

Q4. For the circuit shown in the figure below, the switch is open for a long time and the capacitor is fully discharged. The switch closes at time t = 0s. Find an expression for the current in the inductor after the switch closes. Draw a plot for the inductor current and the energy stored in the inductor. (5 points)

Given: $Vo = 2V$, $L = 1\mu H$, $R = 1\Omega$, $C = 0.04\mu F$ and $n = 2$.



$i_L(t)$=