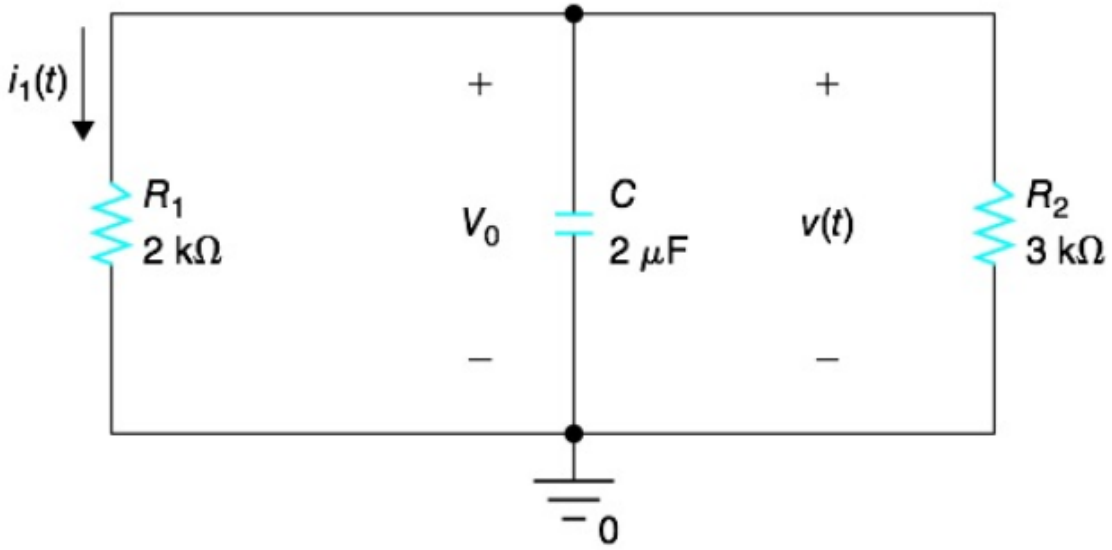
Tutorial 4 for CAD
Sample Questions and Exercises

2019 Fall

1 Natural Response of RC Circuit

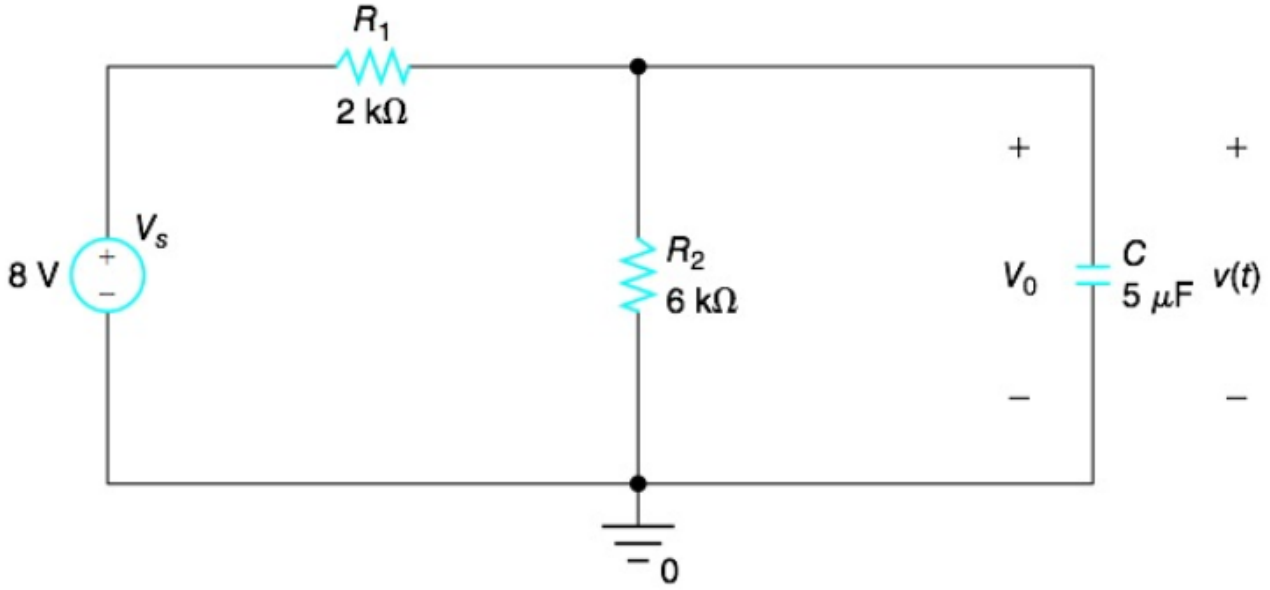
- The initial voltage across the capacitor at t=0 in the circuit shown below is $V_0 = 3V$



a. Find voltage $v(t), t \geq 0$, across capacitor C.
b. Find current $i_1(t), t \geq 0$, through resistor R_1.

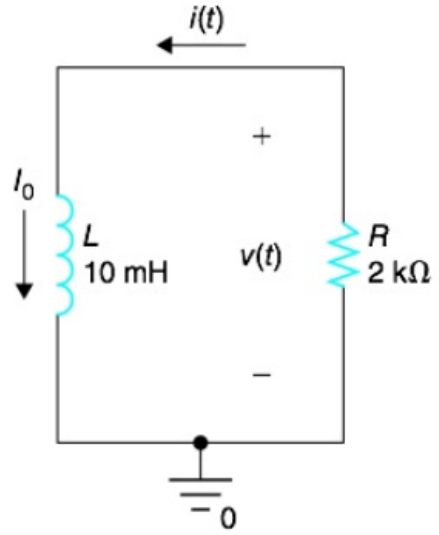
2 Step Response of RC Circuit

- The initial voltage across the capacitor at t = 0 in the circuit shown below is 1v. Voltage Vs is applied at t=0; that is, Vs = 8 u(t) V. Find voltage v(t), t>=0, across the capacitor.



3 Natural Response of RL Circuit

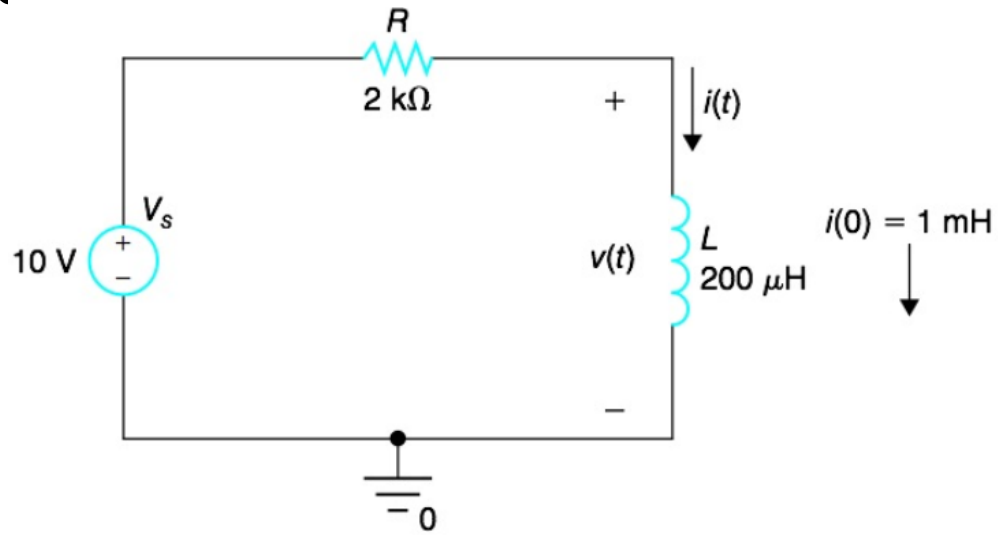
- The initial current through the inductor at t=0 in the circuit shown below is 5 mA.



a. Find the current $i(t)$, $t \geq 0$, through the inductor and plot $i(t)$.
b. Find voltage $v(t)$, $t \geq 0$, across the inductor and plot $v(t)$.

4 Step Response of RL Circuit

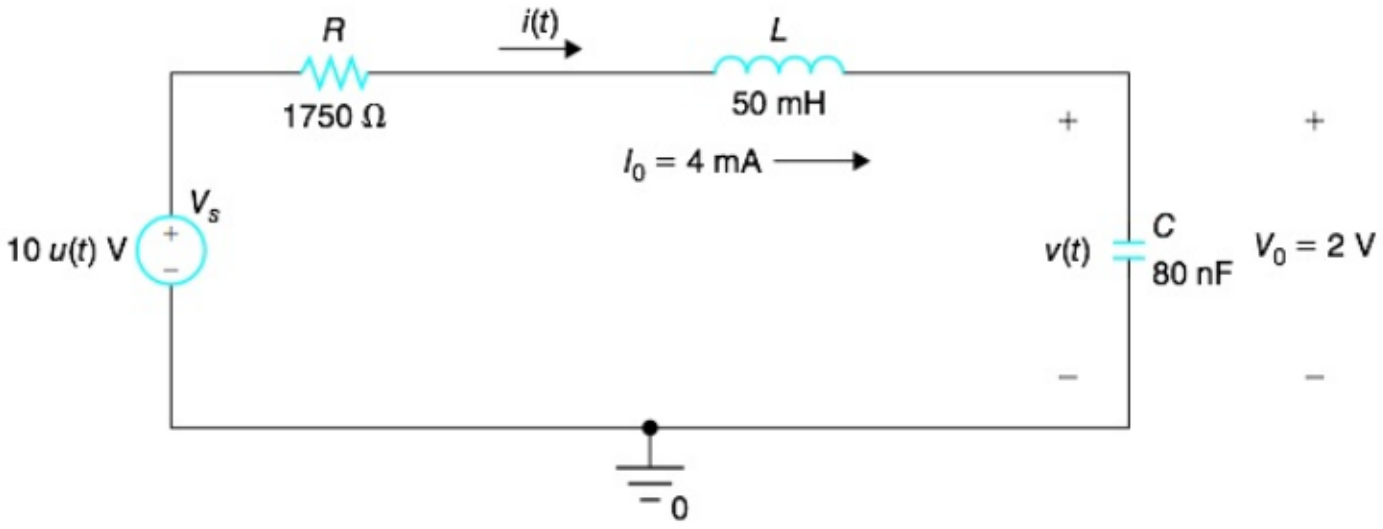
- The initial current through the inductor at t=0 in the circuit shown below is 1mA. The voltage Vs is applied at t=0; that is, Vs=10u(s) V.



a. Find current $i(t)$, $t \geq 0$, through the inductor and plot $i(t)$.
b. Find voltage $v(t)$, $t \geq 0$, across the inductor and plot $v(t)$.

5 Step Response of a Series RLC Circuit

- In the circuit shown below



(Questions are in next page)

5 Step Response of a Series RLC Circuit

a. find α.
b. find ω_0.
c. write a differential equation in $v(t)$.
d. find the characteristic equation.
e. find the roots of the characteristic equation.
f. find the final value of voltage $v(t)$ across the capacitor.
g. find voltage $v(t)$ across the capacitor for $t \geq 0$ and plot $v(t)$.
h. find current $i(t)$ for $t \geq 0$ and plot $i(t)$.