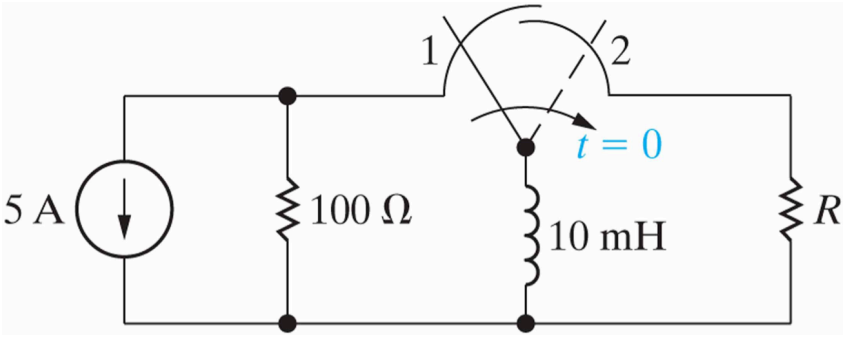
Problem # 1

The switch in the circuit has been in position 1 for a long time. At $t = 0$, the switch moves instantaneously to position 2. Find the value of R so that 10% of the initial energy stored in the 10 mH inductor is dissipated in R in 10 μs.



Problem #2

In the circuit, the voltage and current expressions are

$v = 72e^{-500t}$ V, $t \geq 0$;

$i = 9e^{-500t}$ mA, $t \geq 0^+$.

Find

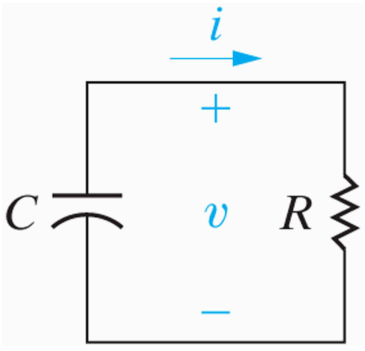
a) R.

b) C.

c) τ (in milliseconds).

d) The initial energy stored in the capacitor.

e) How many microseconds it takes to dissipate 68% of the initial energy stored in the capacitor.



Problem #3

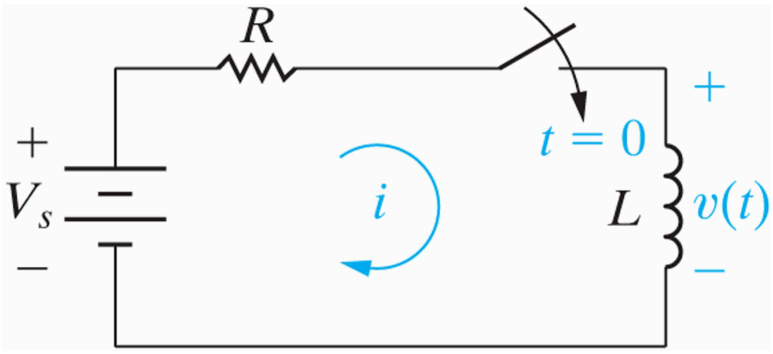
The current and voltage at the terminals of the inductor in the circuit are

a) Specify the numerical values of V_s, I, I_0, and L.

b) How many milliseconds after the switch has been closed does the energy stored in the inductor reach 9 J?

$i(t) = (4 + 4e^{-40t})$ A, $\quad t \geq 0$;

$v(t) = -80e^{-40t}$ V, $\quad t \geq 0^+$.



Problem #4

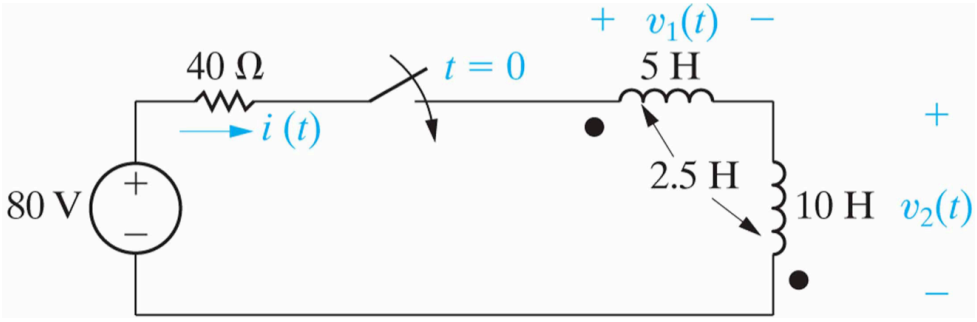
There is no energy stored in the circuit at the time the switch is closed.

a) Find $i(t)$ for $t \geq 0$.

b) Find $v_1(t)$ for $t \geq 0^+$.

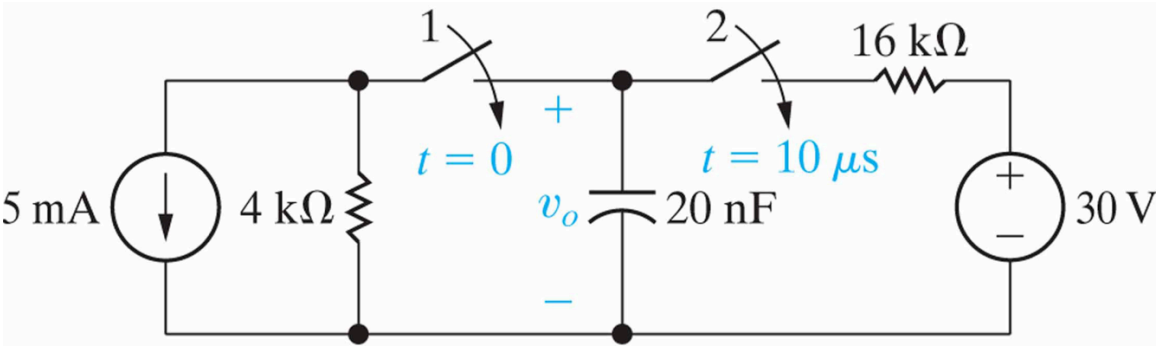
c) Find $v_2(t)$ for $t \geq 0$.

Do your answers make sense in terms of known circuit behavior?



Problem #5

There is no energy stored in the capacitor in the circuit when switch 1 closes at $t = 0$. Ten microseconds later, switch 2 closes. Find $v_o(t)$ for $t \geq 0$.



Problem #6

The capacitor in the circuit shown is charged to 20 V at the time the switch is closed. If the capacitor ruptures when its terminal voltage equals or exceeds 20 kV, how long does it take to rupture the capacitor?