Homework 8

1) There is no energy stored in the $15\,\mu F$ and $5\,\mu F$ capacitors at the time the switch is closed in the circuit of Fig.1.
Find (a) the initial value $v(0)$, (b) the final value $v(\infty)$, (c) the time constant τ, and (d) the expressions $v(t)$ and $i(t)$ for $t \geq 0$.
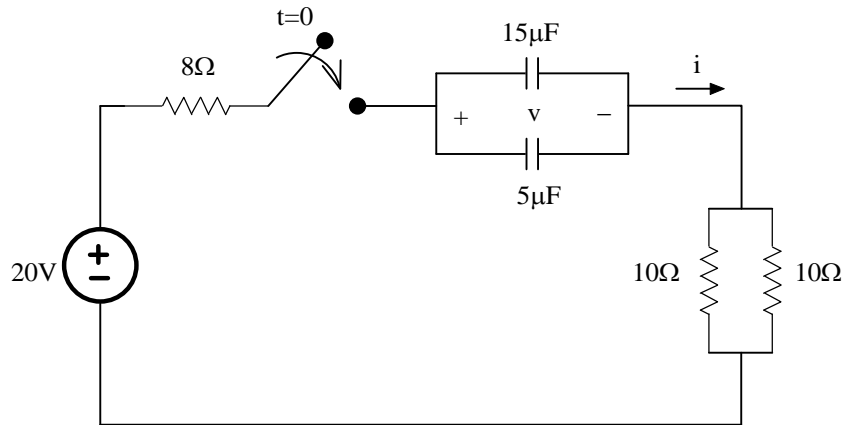

Fig.1.

2) In the circuit of Fig.2, the voltage and current expressions are

$$v(t) = 40e^{-\alpha t} \quad (V), \quad \text{for } t \geq 0^+$$
$$i(t) = 4e^{-\alpha t} \quad (A), \quad \text{for } t \geq 0$$

where $\alpha = 5$ (1/sec).
Find (a) the resistance R, (b) the time constant τ, (c) the inductance L, (d) the initial energy stored in the inductor.
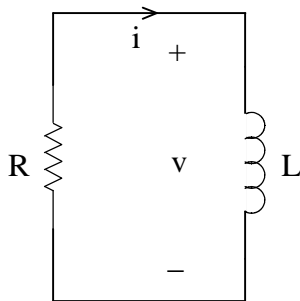

Fig.2.

3) The switch in the circuit of Fig.3 has been closed for a long time before opening at $t = 0$. Find (a) the initial voltage across the capacitor $v(0)$, (b) the time constant τ, (c) the voltage $v(t)$ for $t \geq 0$, (d) the initial energy stored in the capacitor.
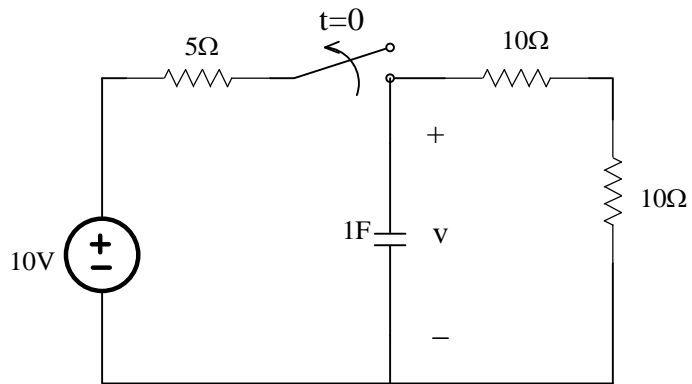

Fig.3.