Handwritten Assignments 2

1- The two series-connected capacitors in Fig. 1 are connected to the terminals of a black box at

t = 0. The resulting current for is known to be $800e^{-25t}$ μA.

a) Replace the original capacitors with an equivalent capacitor and find $\upsilon_o(t)$ for $t \geq 0$.

b) Find $\upsilon_1(t)$ for $t \geq 0$.

c) Find $\upsilon_2(t)$ for $t \geq 0$.

d) How much energy is delivered to the black box in the time interval $0 \leq t \leq \infty$

e) How much energy was initially stored in the series capacitors?

f) How much energy is trapped in the ideal capacitors?

g) Show that the solutions for υ_1 and υ_2 agree with the answer obtained in (f).

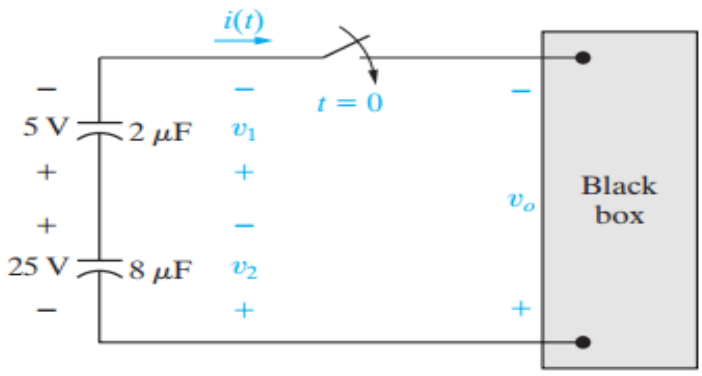

Fig. 1

2- In the circuit shown in Fig .2, the switch has been in position a for a long time. At t=0, it moves instantaneously from a to b.

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

b) What is the total energy delivered to the resistor?

c) How many time constants does it take to deliver 95% of the energy found in (b)?

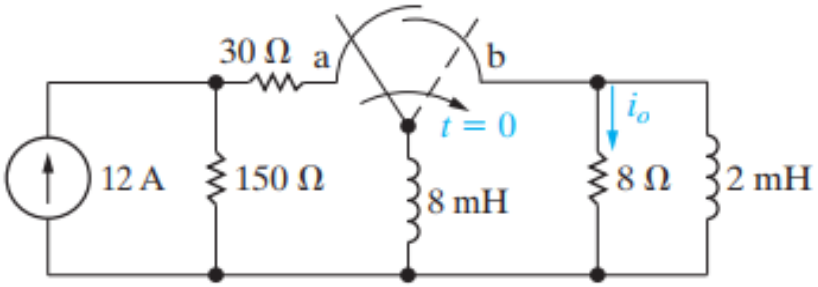

Fig .2

3- The switch in the circuit in Fig. 3 has been in the left position for a long time. At t=0, it moves to the
right position and stays there.

a) Find the initial voltage drop across the capacitor.
b) Find the initial energy stored by the capacitor.
c) Find the time constant of this circuit for t > 0.
d) Write the expression for the capacitor voltage υ(t) for t≥0.

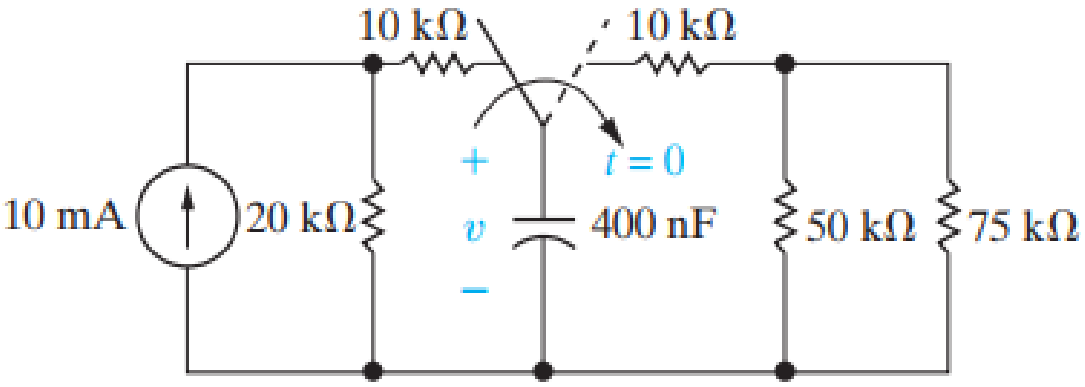

Fig. 3