Tutorial Sheet 3 (Transient)

1. The switch in the circuit of Fig.1 is closed at t = 0. Before that the circuit was in steady state. Assuming that the inductance is ideal, find the current through the inductor at t = 10 s.

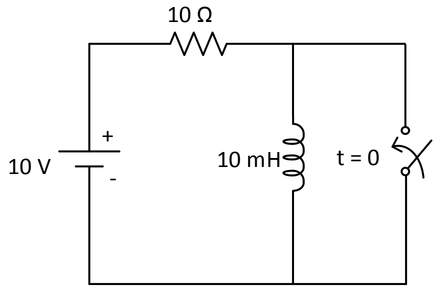

Fig. 1

2. The switch in Fig.2 was in open condition for a long time and closed at time t = 0. Find current i_{AB} as function of time thereafter.

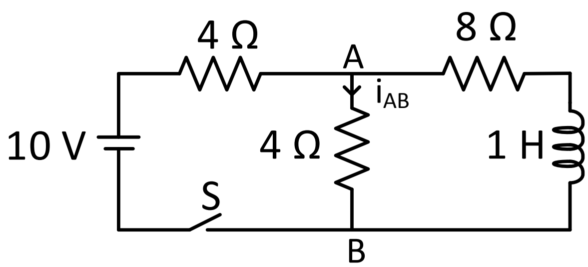

Fig. 2

3. The circuit in Fig.3 was in steady-state for t<0, and the switch is opened at t = 0. Find the voltage V_x at t = 100 μs.

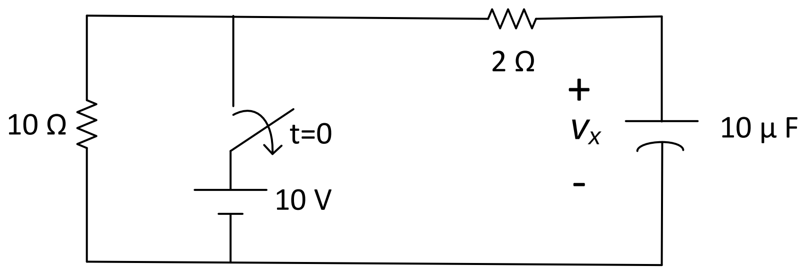

Fig. 3

4. The circuit in Fig.4 was in steady-state for t<0, and the switch is closed at t = 0. Find the values of i_L, i_1 and i_2 at t = 20 sec.

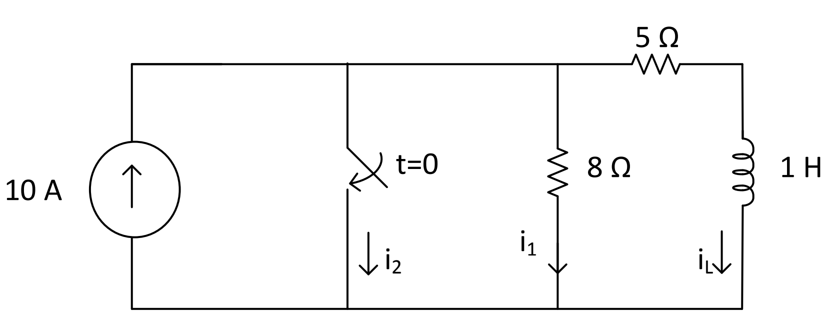

Fig. 4

5. The circuit in Fig.5 was in steady-state for t<0, and the position of the switch is changed at t = 0. Find the capacitor voltage $V_c(t)$ and the current i(t) in the 100 Ω resistor for all time.

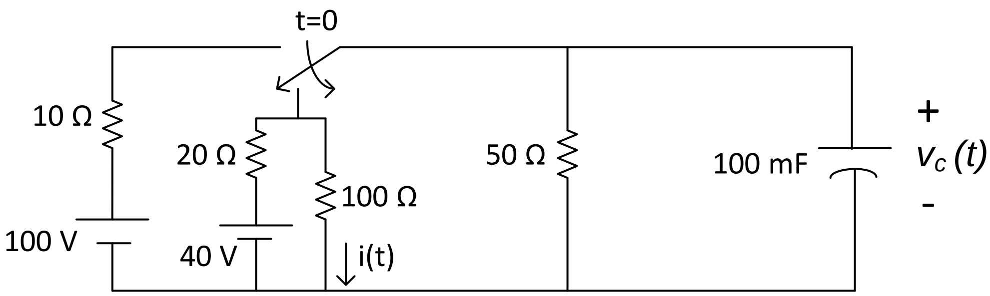

Fig. 5

6. In the circuit of Fig.6, the switch was open and the circuit was operating at steady state. At t=0, the switch is closed. Derive the expression for inductor current $i(t)$ for t>0.

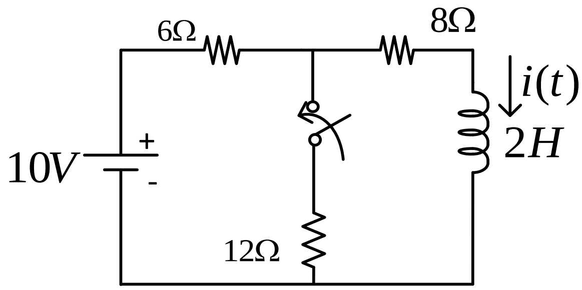

Fig. 6

7. In the circuit of Fig.7, the switch was open and the circuit was operating at steady state. At t=0, the switch is closed. Obtain the expression for inductor current $I_L(t)$ for t>0.

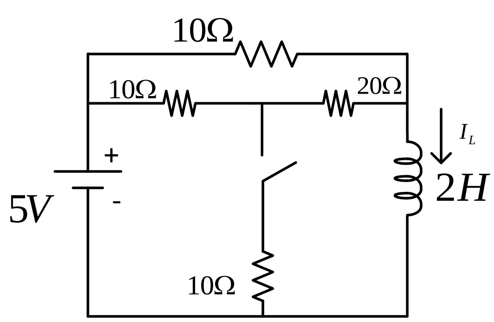

Fig. 7

8. The circuit in Fig.8 was in steady state and the switch S was open. At t=0, and the switch is closed. Find the expression of the current i(t) through the inductor of 2 H for t>0.

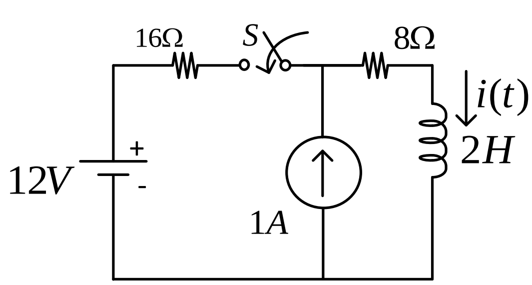

Fig. 8

9. The circuit in Fig.9 was in steady state and the switch S was open. At t=0, and the switch is closed. Find the expression of the current $i_c(t)$ through the capacitor for for t>0.

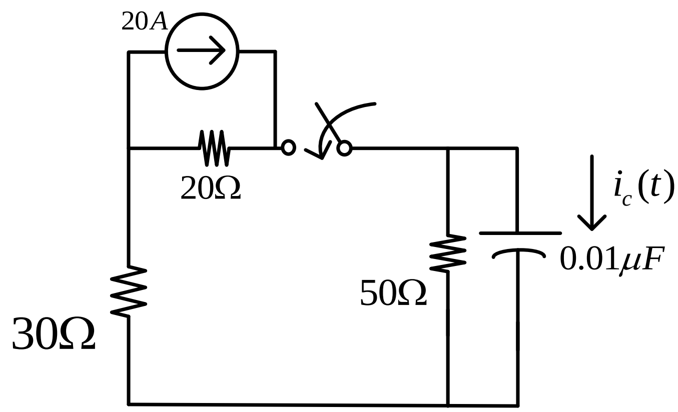

Fig. 9

10. The network in Fig.10 was at steady-state and the switch was open. Obtain the expression of the current i(t) for t>0 when an AC voltage source $v(t) = V\sin\omega t$ is connected at t=0.

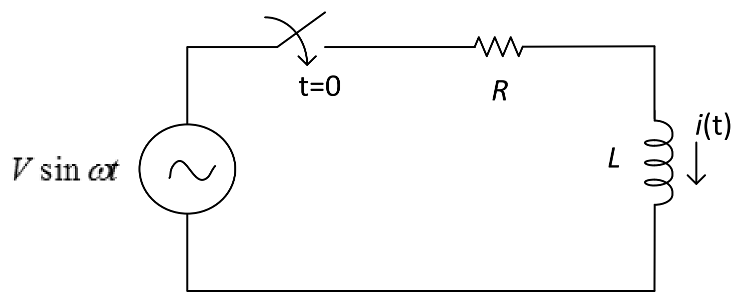

Fig. 10

11. In the circuit shown in Fig.11, assume that, initially the switch is not connected to either A or B terminal and the capacitor voltage is zero. At t=0 sec, the switch is connected to A terminal. Then, at t=1s, the switch is disconnected from A terminal and connected to B terminal. Calculate $V_C(0+)$, $\frac{dV_C(0+)}{dt}$, $V_C(1-)$, $\frac{dV_C(1-)}{dt}$ and $V_C(1+)$, $\frac{dV_C(1+)}{dt}$ and $V_C(+\infty)$. Also, calculate the value of $V_C(t)$ at 2s.

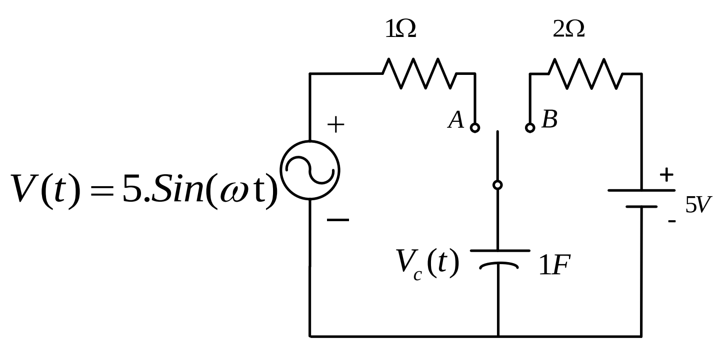

Fig. 11