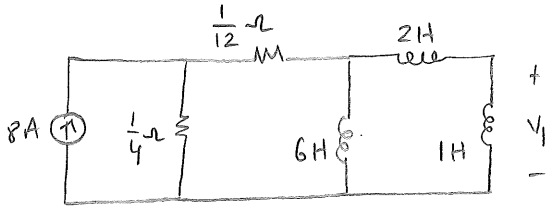
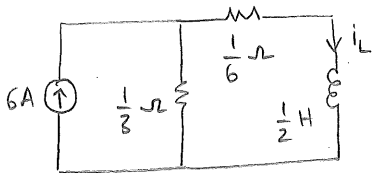
PROBLEM SET VII

1| Initial inductor currents are zero. Find $v_1(t)$ for $t \geq 0$.

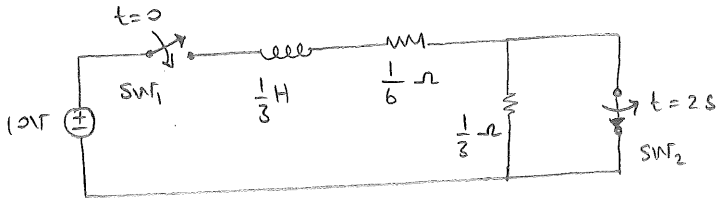


2| Find $i_L(t)$ for $t \geq 0$.



$i_L(0) = 2A$

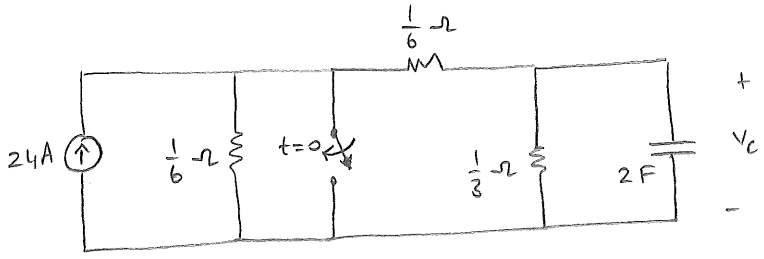
3| Find $i_L(t)$ for $t \geq 0$



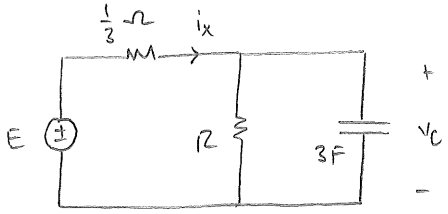
SW_1 : (initially open) closes at $t = 0$

SW_2 : (initially closed) opens at $t = 2s$

4| The circuit is initially (switch open) in DC steady state.
Find $v_c(t)$ for $t > 0$ (switch closed).

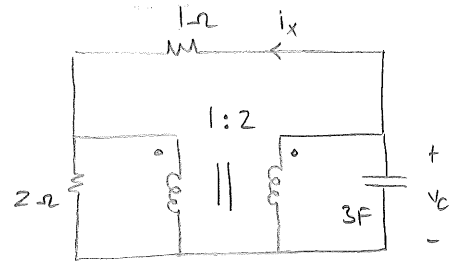


5] Consider the below circuit where E is constant. Find $v_c(0)$, E, 12.



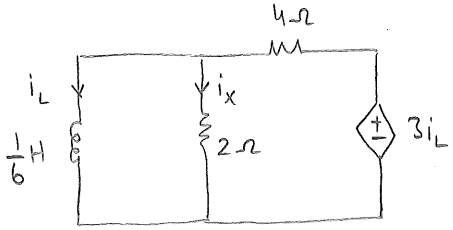
$$i_x(t) = 12 - 9e^{-3t} \text{ A}$$

6] Find $i_x(t)$ for $t \geq 0$.



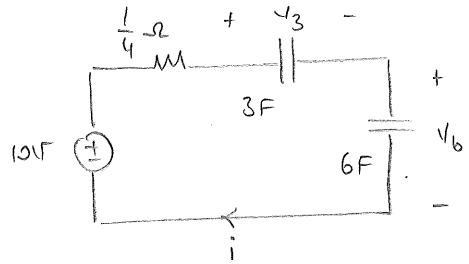
$$v_c(0) = 6\text{V}$$

7] [ABS] Find $i_x(t)$ for $t \geq 0$.



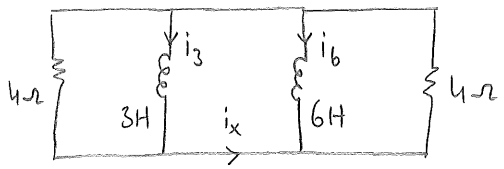
$$i_L(0) = -12\text{A}$$

8] Find $i(t)$ and $v_6(t)$ for $t \geq 0$.



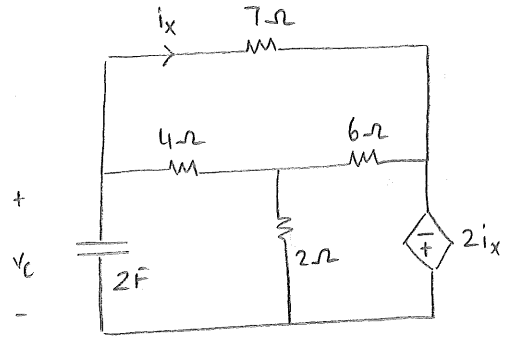
$$v_3(0) = 2\text{V}, \quad v_6(0) = 3\text{V}$$

9| Find $i_x(t)$ for $t \geq 0$.



$i_3(0) = 3A$, $i_6(0) = 1A$

10| Find $i_x(t)$ for $t \geq 0$.



$v_c(0) = 10V$

KEY

1| $v_1(t) = \frac{2}{3} e^{-t/6}$ V

2| $i_L(t) = 4 - 2e^{-t}$ A

3| $$i_L(t) = \begin{cases} 60[1 - e^{-t/2}] \text{ A} & \text{for } 0 \le t < 2 \\ 20 + [I_2 - 20] e^{-\frac{3}{2}(t-2)} \text{ A} & \text{for } t \ge 2 \end{cases} \qquad I_2 = 60\left(1 - \frac{1}{e}\right)$$

4| $v_c(t) = 2e^{-3t/2}$ V

5| $v_c(0) = 5$V , $E = 6$V , $R = \frac{1}{6}\ \Omega$

6| $i_x(t) = 3e^{-t/8}$ A

7| $i_x(t) = 2e^{-2t}$ A

8| $i(t) = 20e^{-2t}$ A , $v_6(t) = \frac{14}{3} - \frac{5}{3} e^{-2t}$ V

9| $i_x(t) = \frac{1}{3} + \frac{2}{3} e^{-t}$ A

10| $i_x(t) = 2e^{-t/5}$ A