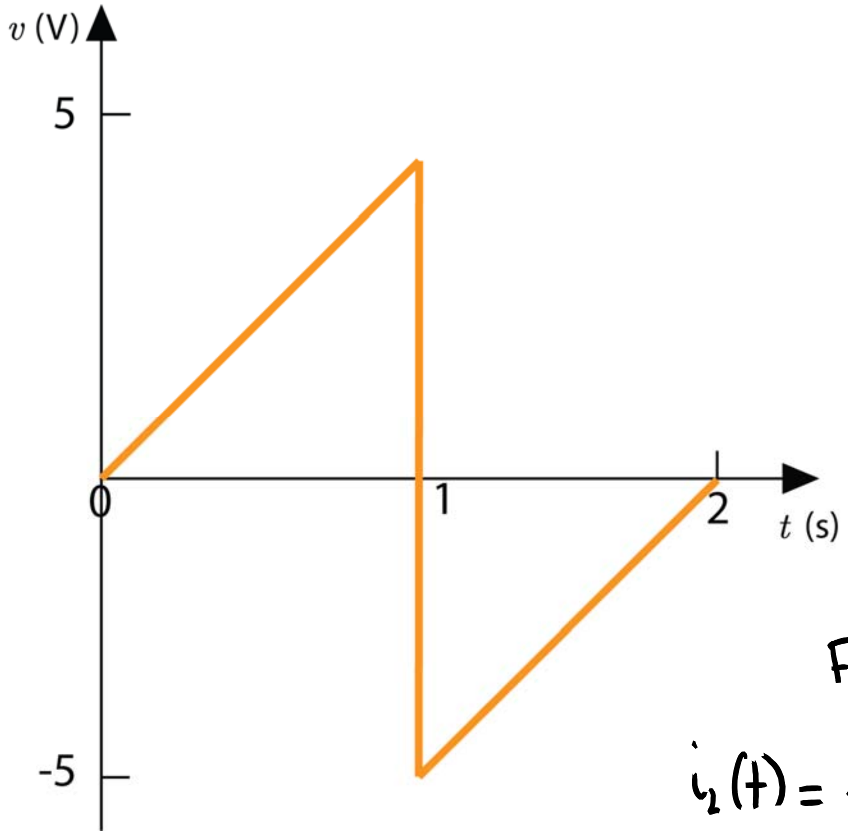


$$V_L(t) = L\frac{di_L}{dt} \longrightarrow i_L(t) = \frac{1}{L}\int_0^t V_L(t)\,dt + i(0)$$

$$V_L(t) \begin{cases} 5t & 0<t<1 \\ -10+5t & 1<t<2 \end{cases}$$

For $0<t<1$

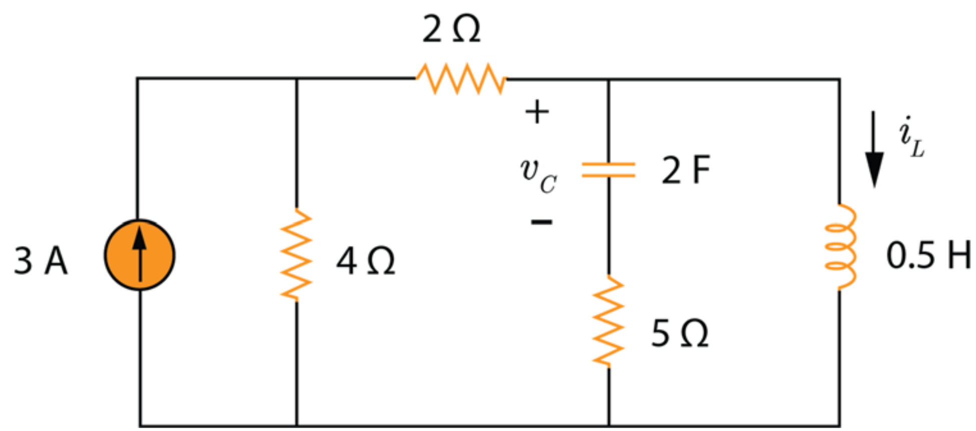
$$i_L(t) = \frac{1}{L}\int_0^t V_L(t)\,dt + \overset{=0}{i(0)} = \frac{1}{25\cdot 10^{-3}}\int_0^t 5t\,dt = 100t^2 \text{ A}$$

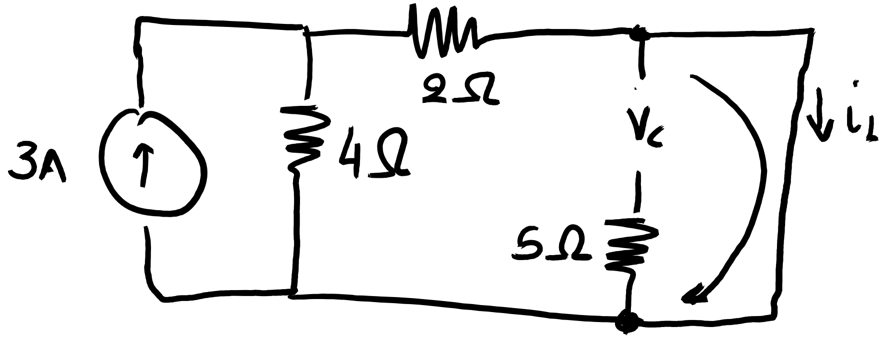
For $1<t<2$

$$i_L(t) = \frac{1}{L}\int_1^t (-10+5t)\,dt + \overset{=100}{i(1)} = 400 - 400t + 100t^2 \text{ A}$$

i) dc conditions $\Rightarrow$ L -> short circuit

ii) steady state   C -> open circuit





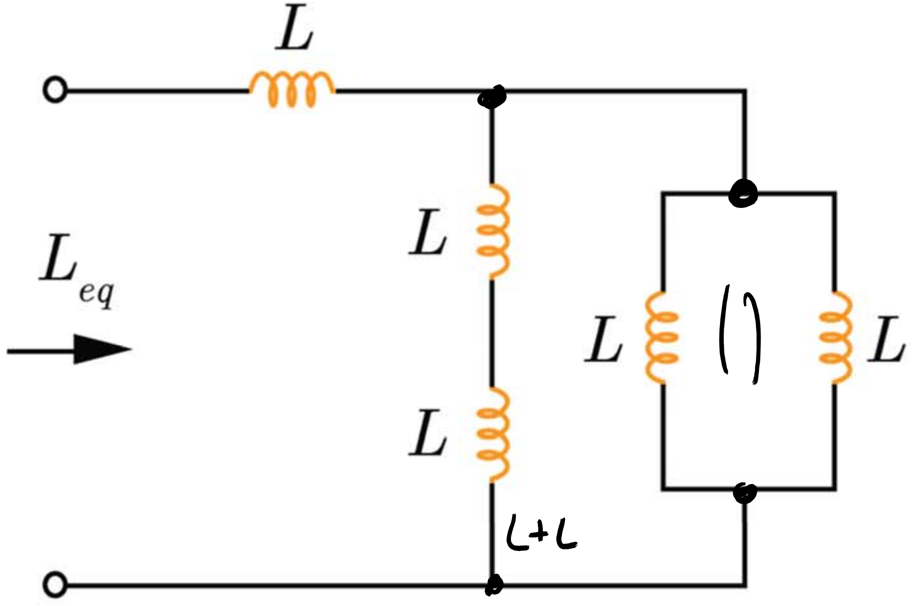
i) Using current divider

$$i_L = \frac{4}{4+2} 3 = 2A$$

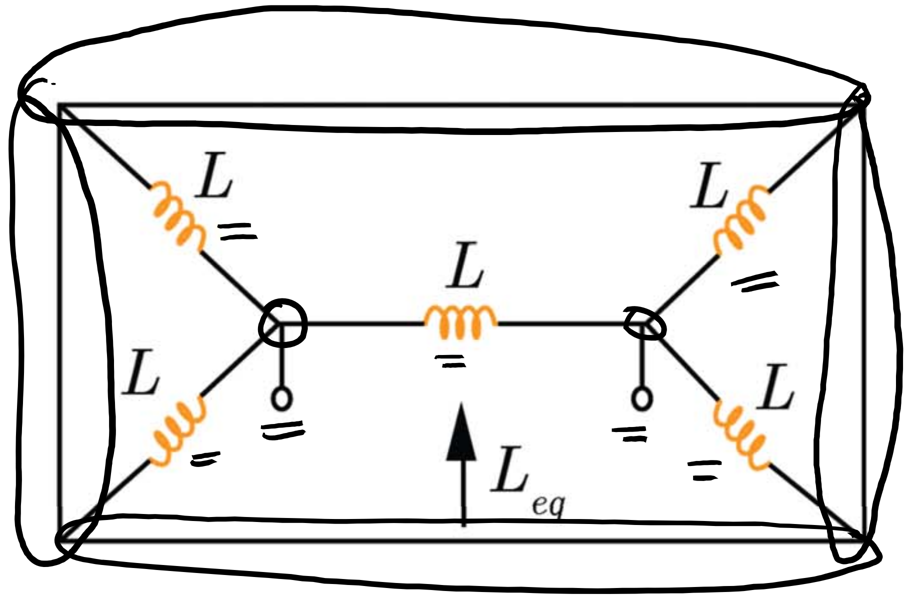
$$V_c = 0V$$

$$E_L = \frac{1}{2} L \cdot i_L^2 = \frac{1}{2} \cdot \frac{1}{2} \cdot 2^2 = 1J$$

$$E_c = \frac{1}{2} C v_c^2 = 0J$$



(a)



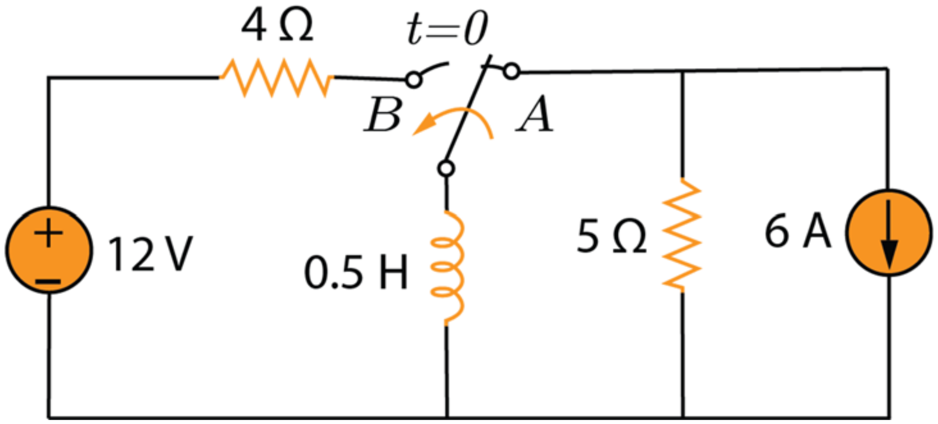
(b)

$$L_{eq} = L + \left(2L \,||\, \frac{L}{2}\right)$$

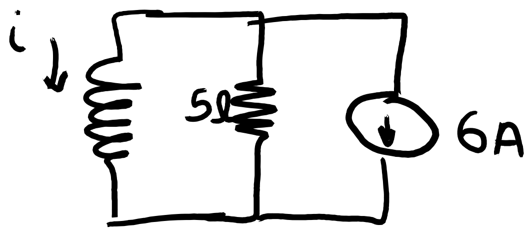
$$= L + \frac{2L \cdot L/2}{2L + L/2} = 1.4L$$

$$L_{eq} = L \,||\, \left(\frac{L}{2} + \frac{L}{2}\right)$$

$$= L||L = L/2$$



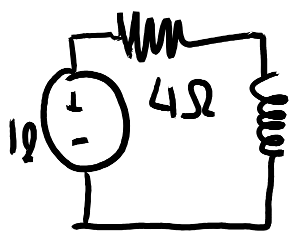
When Switch at A:



L → short circuit

$i_L = -6A$

when switch at B:



$i_L = \frac{12}{4} = 3A$

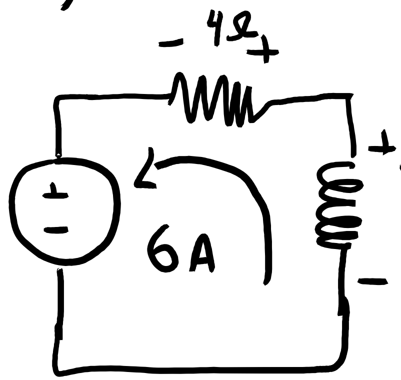
$$i(t) = i(\infty) + [i(0) - i(\infty)] e^{-t/\tau}$$

$$\underline{\underline{\tau}} = \frac{L}{R} = \frac{0.5}{4} = \frac{1}{8} \text{ sec}$$

$t>0$

$$i(t) = 3 - 9e^{-8t} \text{ A}, \quad t \to 0 \text{ sec}$$

ii) at $t = 0^+$ KVL in loop

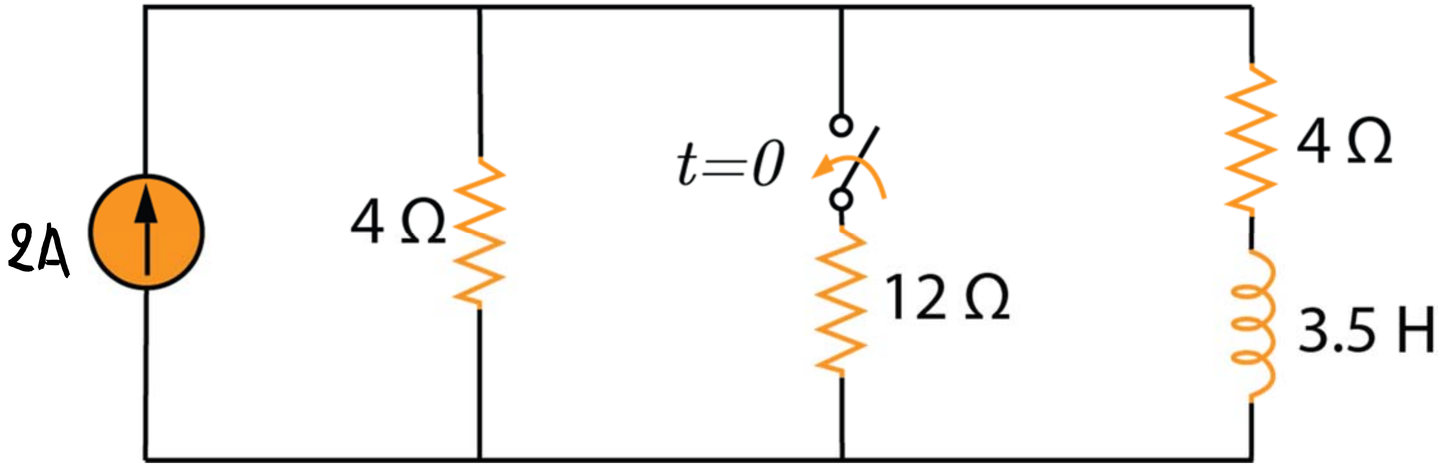


$V_L = 12 + 4 \cdot 6 =$

$= 36V$

iii) At steady state $V_L = 0$

(short-circuit)

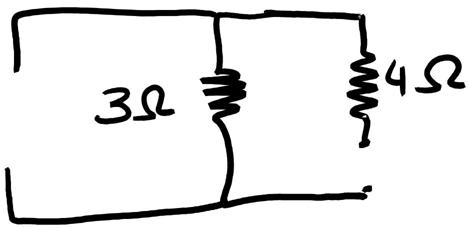


steady state and dc

L → short circuit

Before $t=0$, current divider $i_L = \frac{4}{4+4} \cdot 2 = 1\ A$

After $t=0$ $\quad 4 \| 12 = 3\Omega$ $\qquad i(\infty) = \frac{3}{4+3} \cdot 2 = \frac{6}{7}\ A$



$R_{eq} = 4 + 3 = 7\ \Omega$

$\tau = \frac{L}{R} = \frac{3.5}{7} = \cancel{0.5\,s}$

$$i_L(t) = i(\infty) + [i(0) - i(\infty)]\, e^{-t/\tau}$$

$$= \frac{6}{7} + \left[1 - \frac{6}{7}\right] e^{-2t}$$

$$= \frac{1}{7}\left(6 - e^{-2t}\right)\ A, \quad t \to s$$