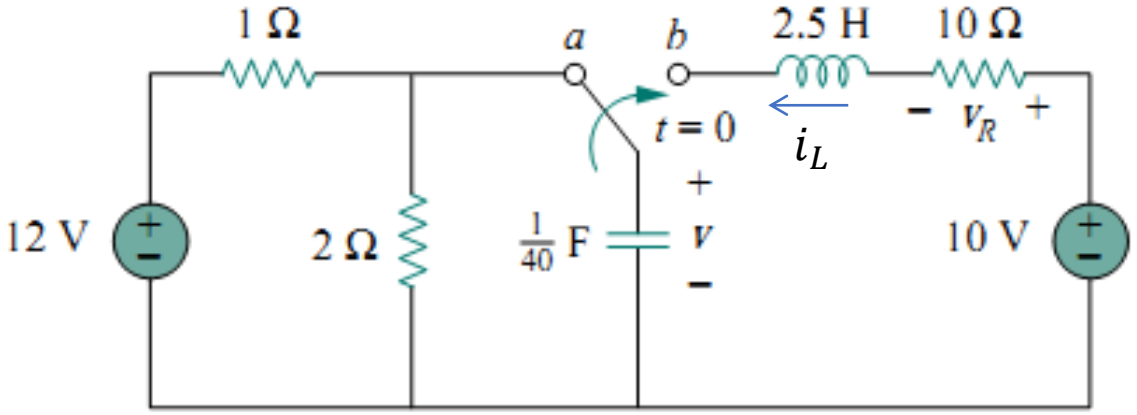
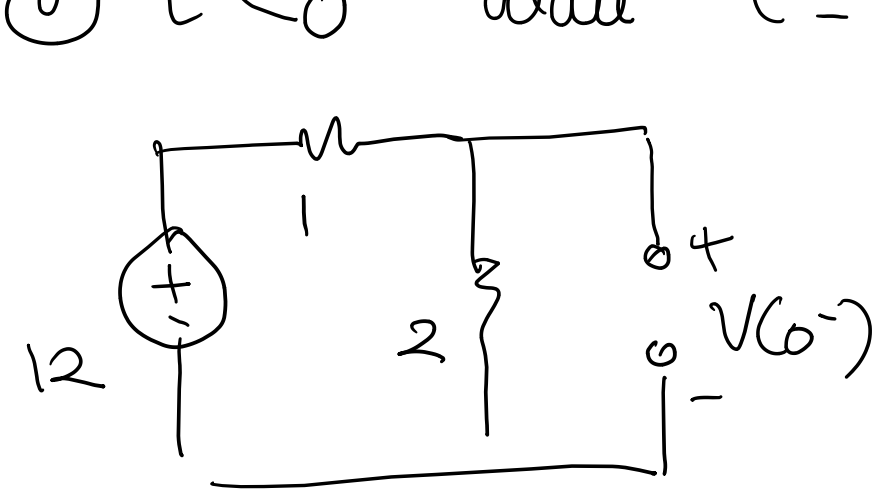
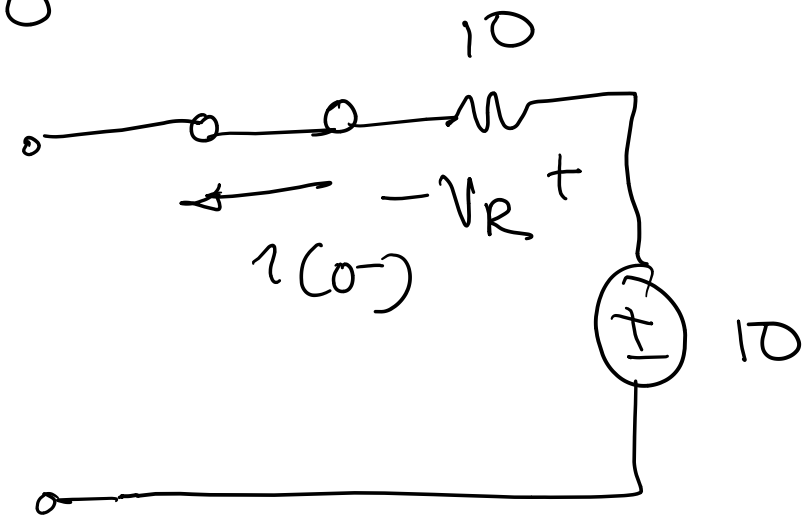



(a) $t < 0$ atau $t = 0^-$

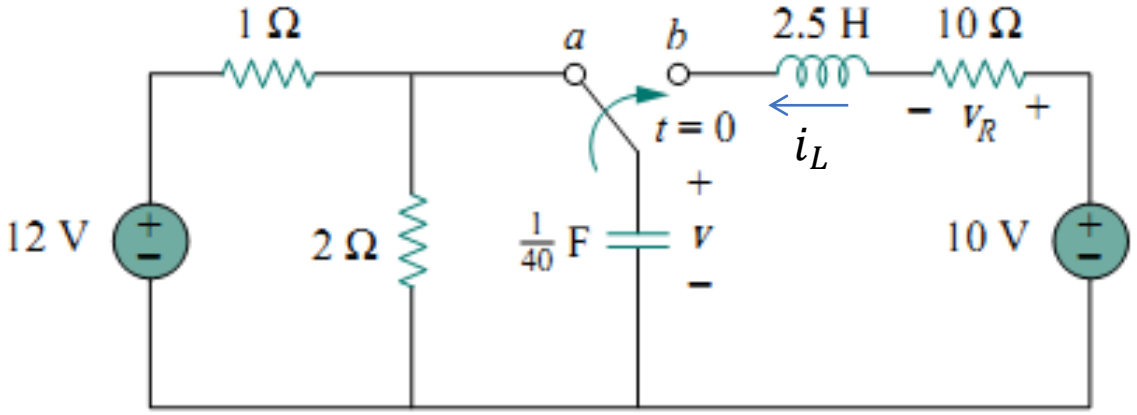



$$V(0^-) = \frac{2}{2+1} \times 12 = 8\,V$$

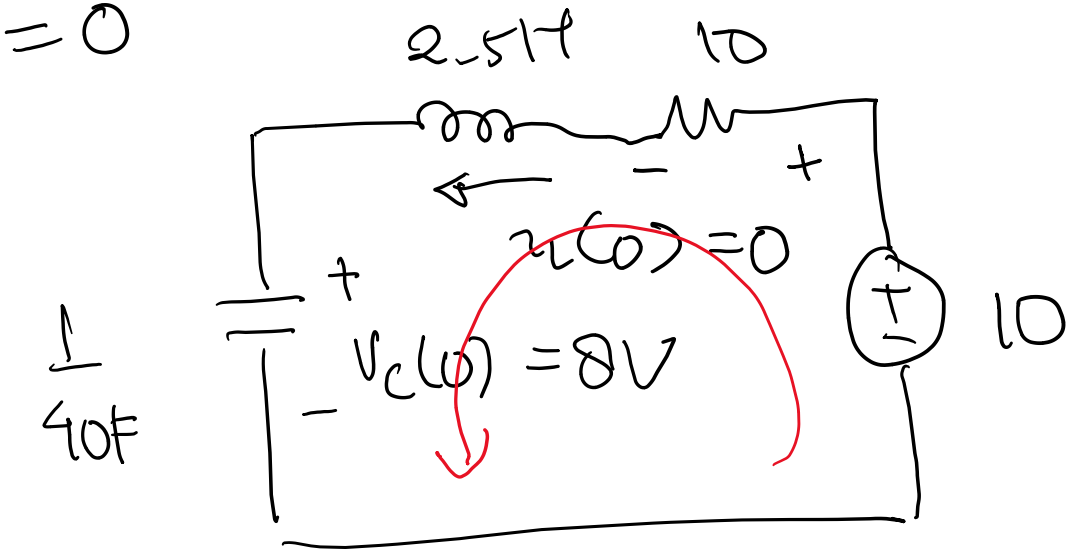
$$i(0^-) = 0\,A$$

$$V_R(0^-) = 0\,V$$




$$\frac{du}{dt} \qquad \frac{dv}{dt}$$

$t = 0$




$V_R(0) = 2V$

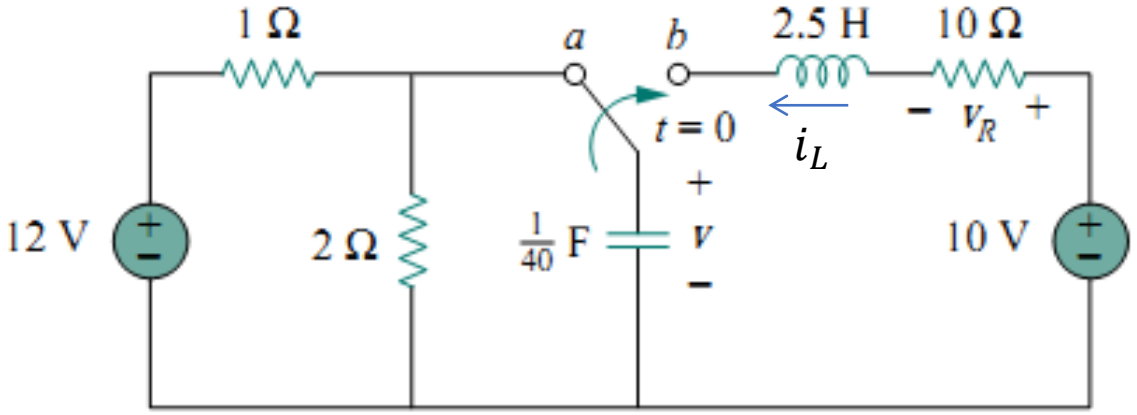
$= 0$

$-10 + V_R + V_L + V_C = 0$

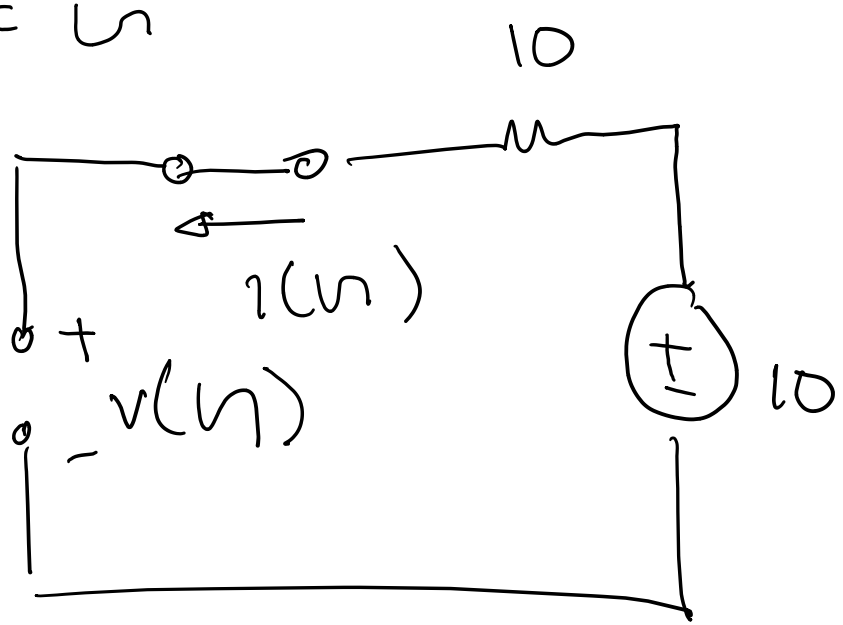
$V_L = 2$

$$L \frac{di}{dt} = V_L$$

$$\frac{di(0)}{dt} = \frac{V_L}{L} = \frac{2}{2.5} = 0.8 A/s$$

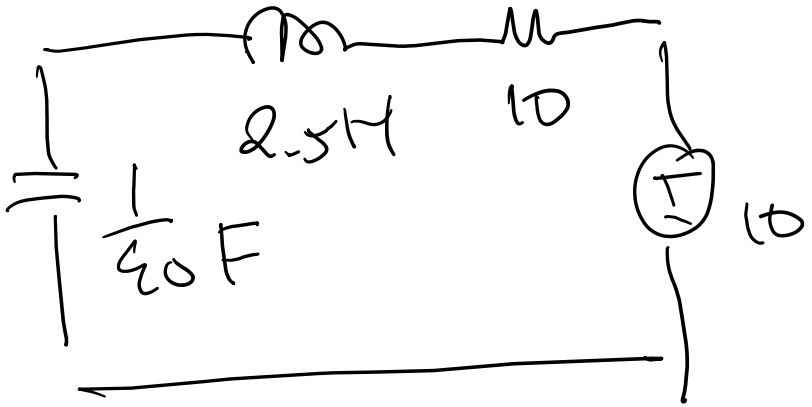



(b) $t = 0_-$




$i(0_-) = 0\ A$

$v(0_-) = 10\ V$




$\rightsquigarrow$ RLC Seri

$$\alpha = \frac{R}{2L} = 2$$

$$\omega_0 = \frac{1}{\sqrt{LC}} = \frac{1}{\sqrt{2.5\,(1/40)}} = 4$$

$\alpha < \omega_0 \rightsquigarrow$ under damped

$$\omega_d = \sqrt{\omega_0^2 - \alpha^2} = \sqrt{12} = 3.464$$

$$i_n(t) = e^{-2t}\left(A_1 \cos 3.464\,t + A_2 \sin 3.464\,t\right)$$

$$i(t) = i(\infty) + i_n$$

$$i(t) = e^{-2t}\left(A_1 \cos 3.464t + A_2 \sin 3.464t\right)$$

$t = 0$

$$i(0) = A_1$$

$$A_1 = 0$$

$$\boxed{\frac{di(0)}{dt}} = -2A_1 + 3.464A_2$$

$$0.8 = 3.464A_2 \Rightarrow A_2 = 0.231$$

$$i(t) = e^{-2t}\left[0.231 \sin(3.464t)\right] \quad A$$

$$V_{R(t)} = 2.31\, e^{-2t} \sin 3.464t \quad V$$

$$V_L = L\frac{di}{dt}$$

$$= 2.5 \cdot 0.231\left[-2e^{-2t}\sin 3.464t + e^{-2t} 3.464 \cos 3.464t\right]$$

$$= -1.155 e^{-2t} \sin 3.464t + 2e^{-2t} \cos 3.464t$$

$$v_L(t) = e^{-2t}\left[-1.155 \sin(3.464t) + 2\cos(3.464t)\right]$$

$$v(t) = 10 - v_L - v_R$$

$$v(t) = 10 - e^{-2t}\left[-1.155 \sin 3.464t + 2\cos 3.464t\right]$$

$$- 2.31\, e^{-2t} \sin 3.464\, t$$

$$= 10 - e^{-2t}\left[1.155 \sin 3.464t + 2\cos 3.464t\right]$$