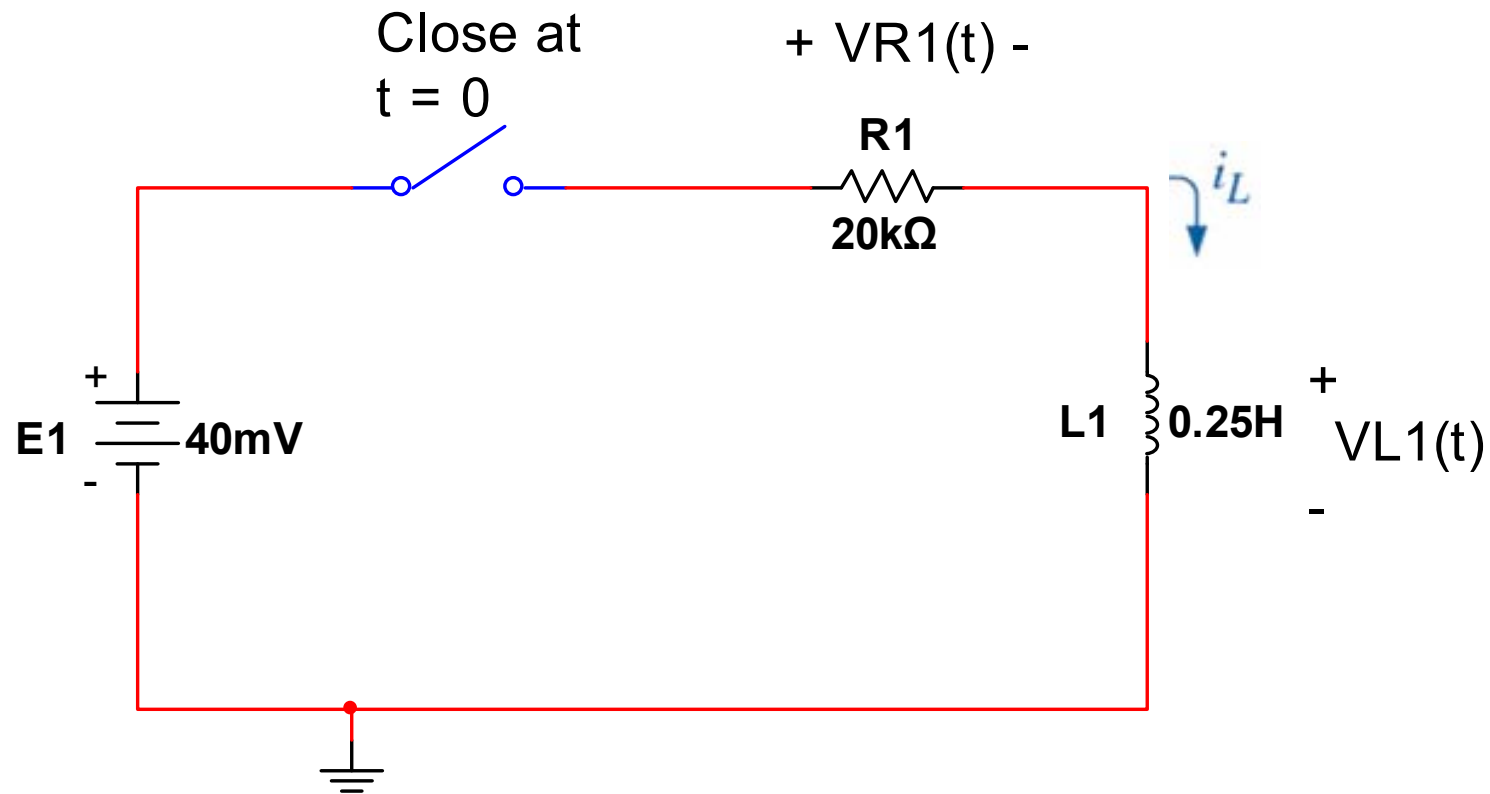


R-L Storage Phase – In Class Problem



1. Find τ
2. Find $i_{L1}(t)$, $t \geq 0$ (eq)
3. Find $v_{L1}(t)$ and $v_{R1}(t)$, $t \geq 0$ (eq)
4. Find i_L and v_L for 1τ , 3τ , & 5τ
5. Sketch $i_{L1}(t)$, $v_{L1}(t)$, & $v_{R1}(t)$, $t \geq 0$

R-L Storage Phase – In Class Problem

$$1. \quad \tau = \frac{L_1}{R_1} = \frac{0.25H}{20k\Omega} = 12.5\mu s$$

$$2. \quad i_{L_1}(t) = \frac{E_1}{R_1}(1 - e^{-t/\tau})A, t \geq 0$$

$$i_{L_1}(t) = 2 \cdot 10^{-6}(1 - e^{-t/12.5 \cdot 10^{-6}})A, t \geq 0$$

$$3. \quad v_{L_1}(t) = E_1 e^{-t/\tau}V, t > 0 \text{ (KVL)}$$

$$v_{L_1}(t) = (40 \cdot 10^{-3})e^{-t/\tau}V, t > 0$$

$$v_{R_1}(t) = i_{L_1} \cdot R_1$$

$$v_{R_1}(t) = E_1(1 - e^{-t/\tau})V$$

$$v_{R_1}(t) = 40 \cdot 10^{-3}(1 - e^{-t/12.5 \cdot 10^{-6}})V, t > 0$$

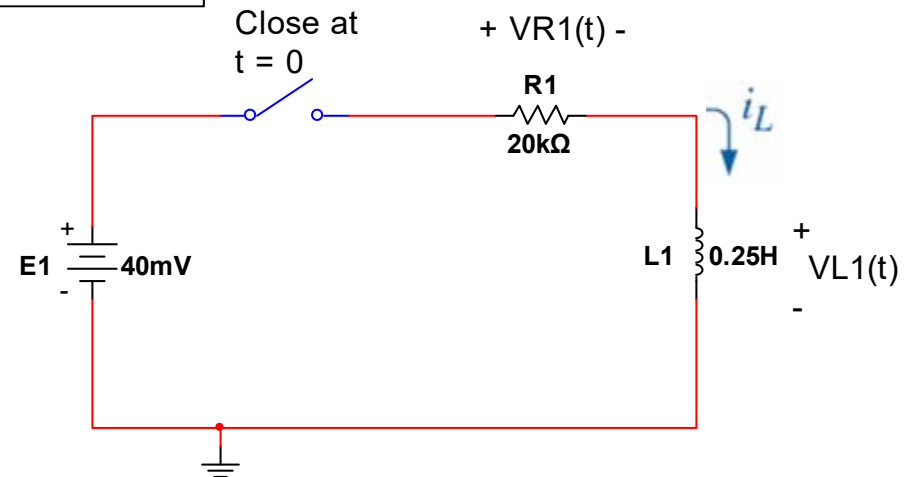
1. Find Tau

2. Find $i_{L_1}(t)$, $t \geq 0$

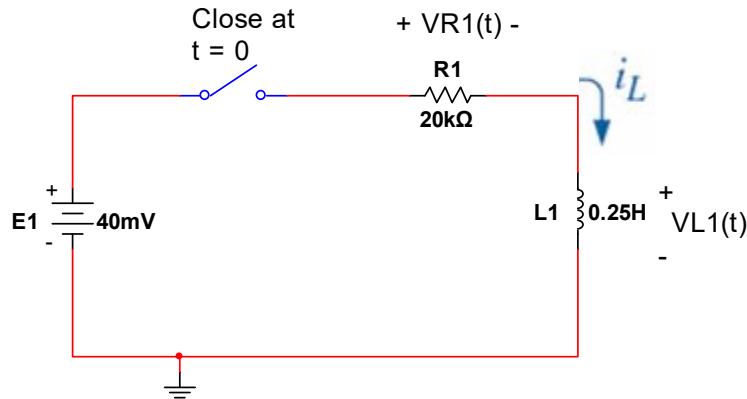
3. Find $v_{L_1}(t)$ and $v_{R_1}(t)$

4. Find i_L and v_L for 1τ , 2τ , & 5τ

5. Sketch $i_{L_1}(t)$, $v_{L_1}(t)$, & $v_{R_1}(t)$



R-L Storage Phase – In Class Problem



1. Find Tau
2. Find $i_{L1}(t)$, $t \geq 0$
3. Find $v_{L1}(t)$ and $v_{R1}(t)$
4. **Find i_L and v_L for 1τ , 2τ , & 5τ**
5. Sketch $i_{L1}(t)$, $v_{L1}(t)$, & $v_{R1}(t)$

$$4. i_{L1}(t) = 2 \cdot 10^{-6} (1 - e^{-t/12.5 \cdot 10^{-6}}) A, t \geq 0$$

$$i_{L1}(\tau) = 1.26 \mu A \quad \mathbf{63\% \text{ of } 2 \mu A}$$

$$i_{L1}(3\tau) = 1.90 \mu A \quad 95\% \text{ of } 2 \mu A$$

$$i_{L1}(5\tau) = 1.987 \mu A \quad 99.3\% \text{ of } 2 \mu A$$

$$v_{L1}(t) = (40 \cdot 10^{-3}) e^{-t/\tau} V, t > 0$$

$$v_{L1}(\tau) = 14.72 mV \quad \mathbf{36.8\% \text{ of } 40 mV}$$

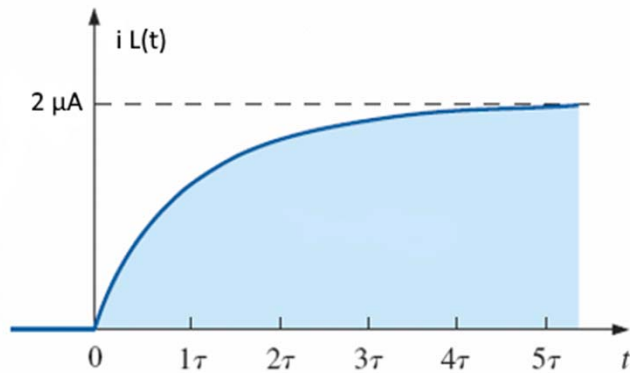
$$v_{L1}(3\tau) = 1.99 mV \quad 4.98\% \text{ of } 40 mV$$

$$v_{L1}(5\tau) = 0.27 mV \quad 0.675\% \text{ of } 40 mV$$

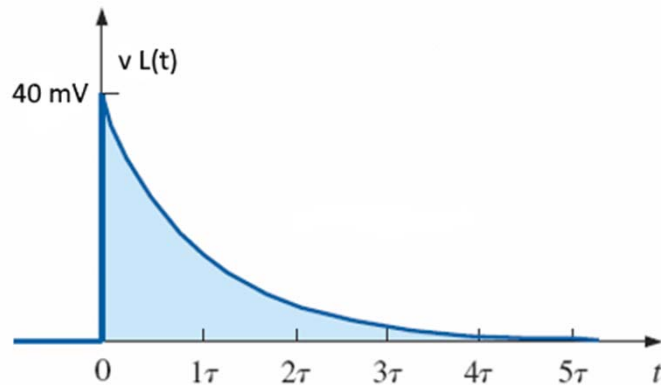
R-L Storage Phase – In Class Problem

5. Sketch $i_{L1}(t)$, $v_{L1}(t)$, & $v_{R1}(t)$

$$i_{L1}(t) = 2 \cdot 10^{-6}(1 - e^{-t/12.5 \cdot 10^{-6}})A, t \geq 0$$



$$v_{L1}(t) = (40 \cdot 10^{-3})e^{-t/\tau}V, t > 0$$



$$v_{R1}(t) = 40 \cdot 10^{-3}(1 - e^{-t/12.5 \cdot 10^{-6}})V, t > 0$$

