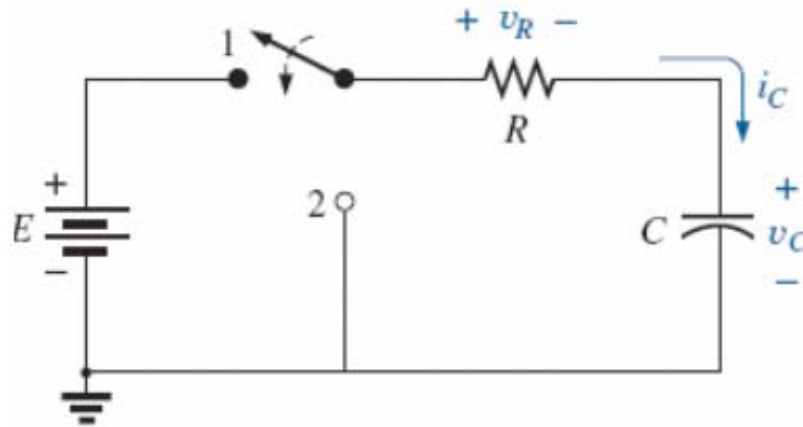


In Class Problem



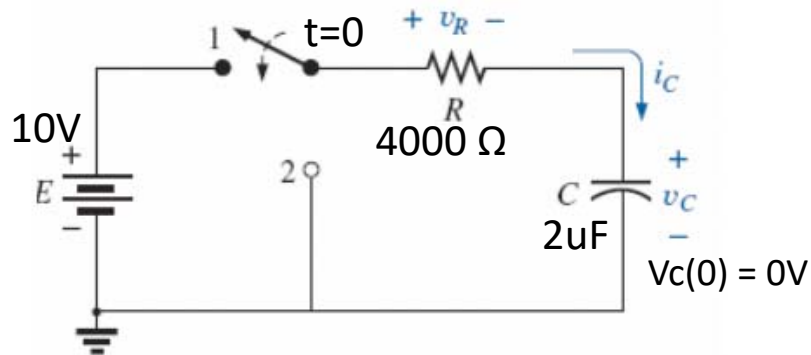
Given:

- There is no initial voltage on the capacitor, $V_C(0) = 0V$
- $E = 10V$, $R = 4000 \text{ Ohms}$, $C = 2\mu F$
- The switch is moved to position 1 at $t=0$

Find:

- $i_C(t)$ and sketch
- $V_C(t)$ and sketch
- $V_R(t)$ and sketch
- $V_C(t)$ at $10ms$
- $i_C(t)$ at $10ms$

In Class Problem



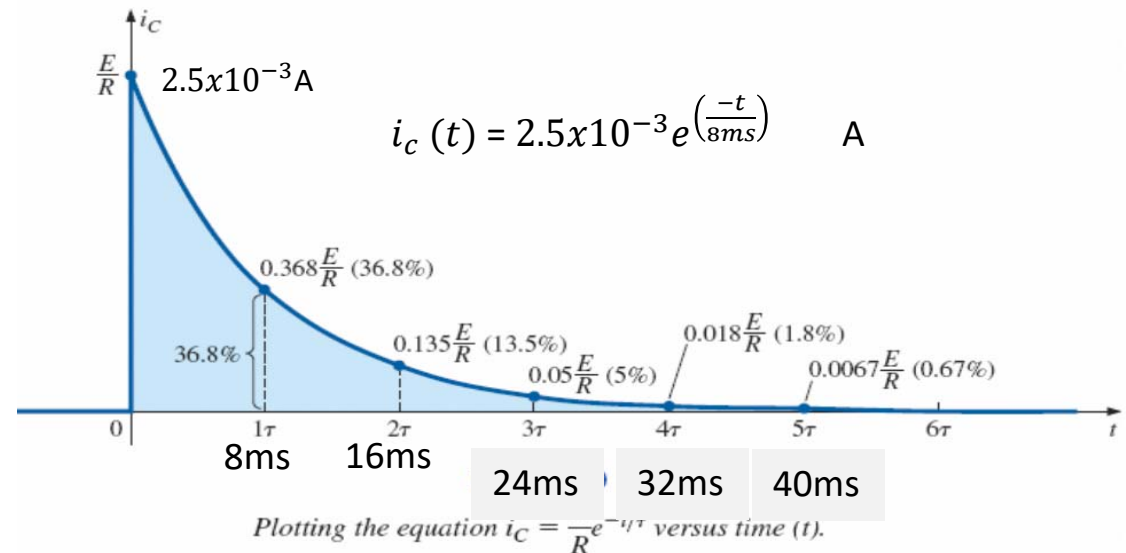
- $i_C(t)$ and sketch

$$i_C(t) = \frac{E}{R} * e^{\frac{-t}{\tau}}$$

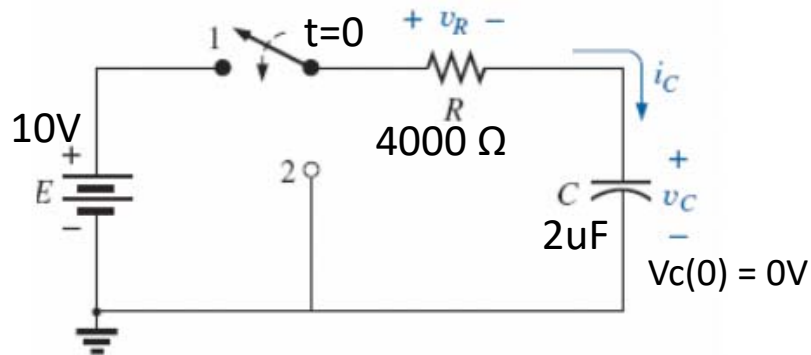
$$\tau = RC = 8ms$$

$$i_C(t) = \frac{10V}{4000 \Omega} e^{\left(\frac{-t}{8ms}\right)}$$

$$i_C(t) = 2.5 \times 10^{-3} e^{\left(\frac{-t}{8ms}\right)} \quad A$$



In Class Problem

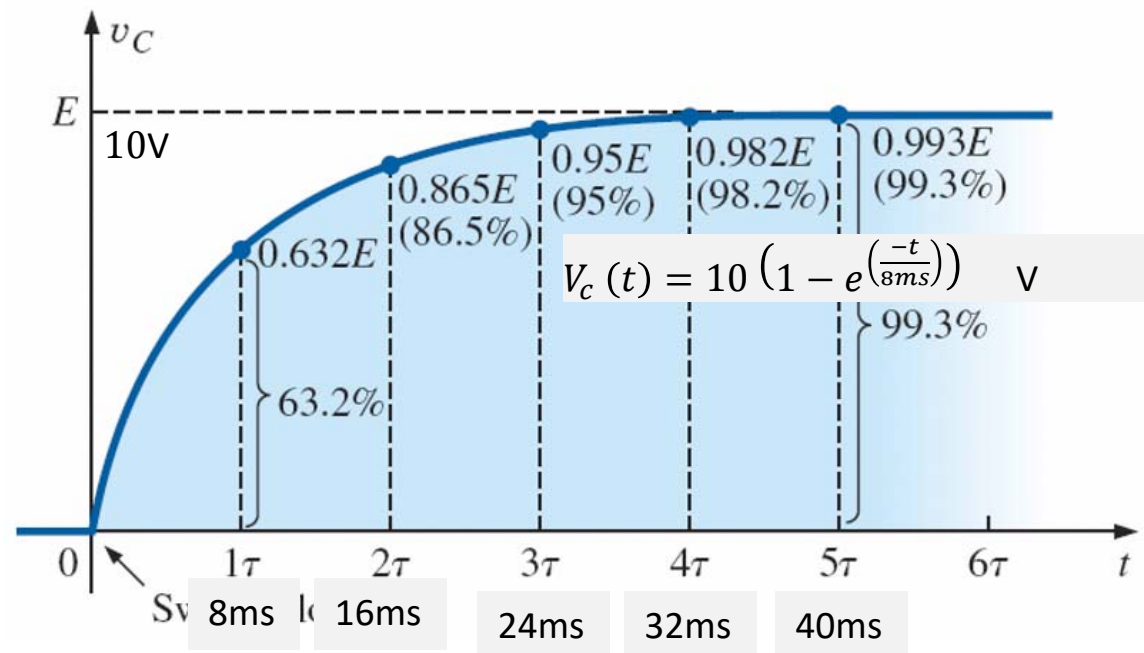


- $V_C(t)$ and sketch

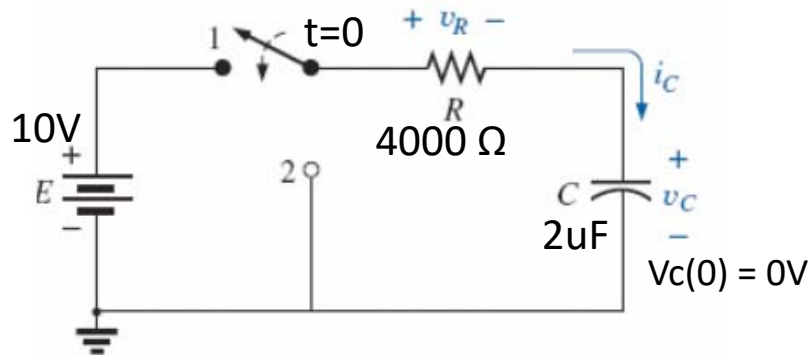
$$V_C(t) = E \left(1 - e^{\frac{-t}{\tau}} \right)$$

$$\tau = RC = 8\text{ms}$$

$$V_C(t) = 10 \left(1 - e^{\left(\frac{-t}{8\text{ms}} \right)} \right) \text{ V}$$



In Class Problem



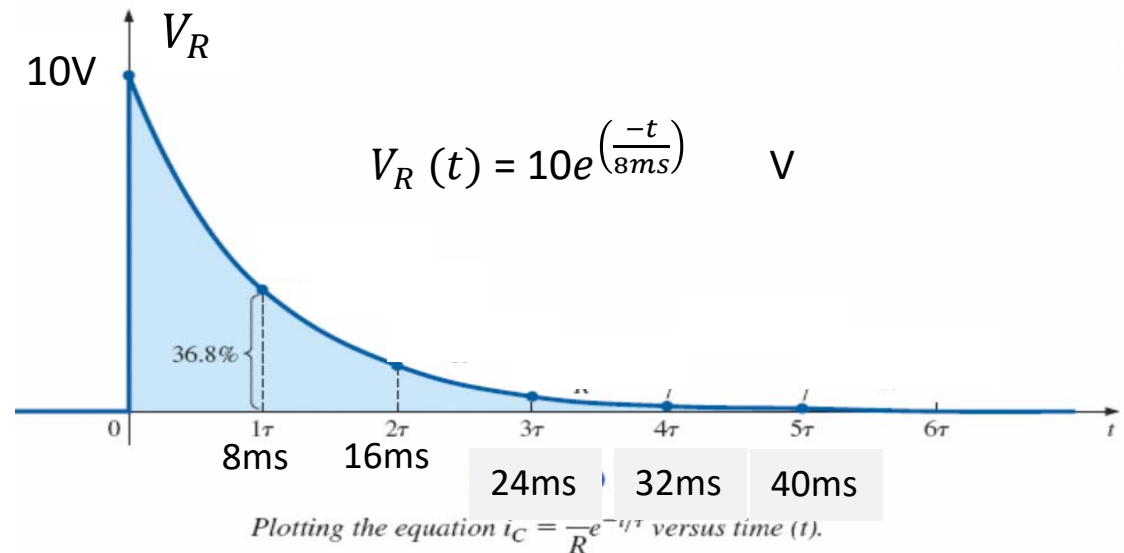
- $V_R(t)$ and sketch

$$i_C(t) = \frac{E}{R} * e^{\frac{-t}{\tau}}$$

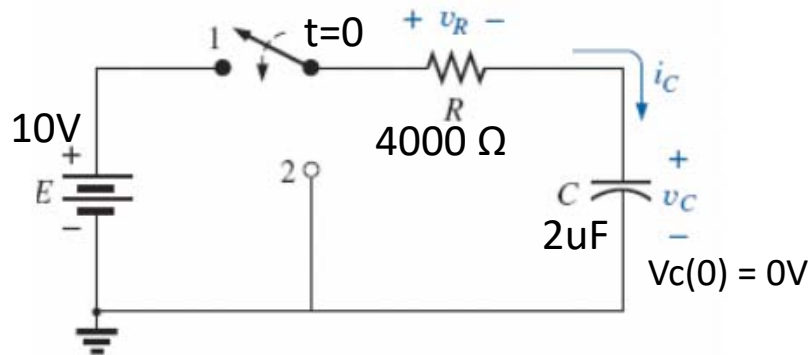
$$\tau = RC = 8\text{ms}$$

$$V_R(t) = E * e^{\frac{-t}{\tau}}$$

$$V_R(t) = 10e^{\left(\frac{-t}{8\text{ms}}\right)} \quad \text{V}$$



In Class Problem



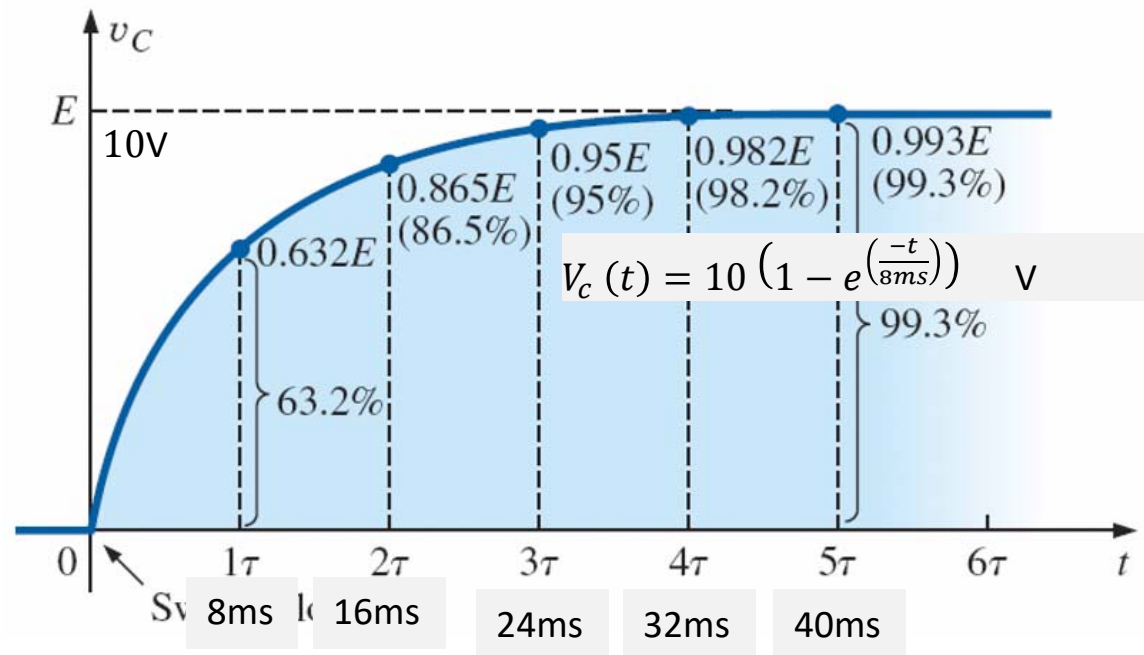
- $V_C(t)$ at 10ms

$$V_C(t) = 10 \left(1 - e^{\left(\frac{-t}{8ms} \right)} \right) \quad V$$

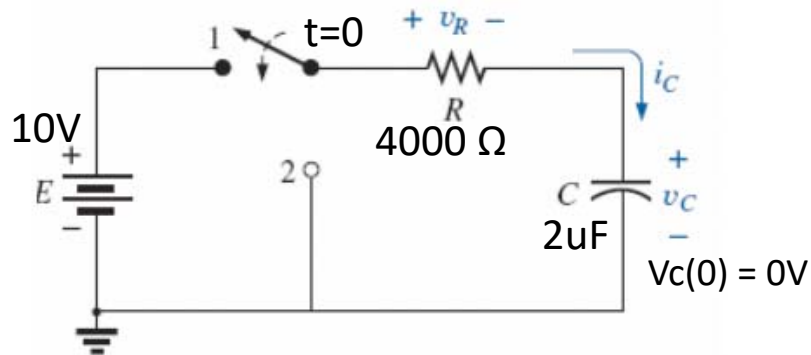
$$V_C(10ms) = 10 \left(1 - e^{\left(\frac{-10ms}{8ms} \right)} \right) \quad V$$

$$V_C(10ms) = 10 (0.7135) \quad V$$

$$V_C(10ms) = 7.14V$$



In Class Problem



- $i_C(t)$ at **10ms**

$$i_C(t) = 2.5 \times 10^{-3} e^{\left(\frac{-t}{8ms}\right)} \quad A$$

$$i_C(t) = 2.5 \times 10^{-3} e^{\left(\frac{-10ms}{8ms}\right)} \quad A$$

$$i_C(t) = 2.5 \times 10^{-3} (0.287) \quad A$$

$$i_C(t) = 716.3 \mu A$$

