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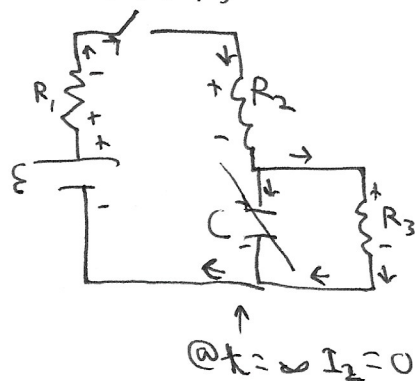
$\boxed{I_2 = 0}$

a) C_{left}: $\varepsilon - I_1 R_1 - I_1 R_2 - \cancel{\dfrac{q}{C}} = 0$

C_{right}: $\dfrac{q}{C} = I_3 R_3 = 0$

C_{tot}: $\varepsilon - I_1 R_1 - I_1 R_2 - I_3 R_3 = 0$

$\therefore$ $\varepsilon - I_1 R_1 - I_1 R_2 = 0$

$\varepsilon - I_1 R_1 - I_1 R_2 - I_3 R_3 = 0$

$\therefore$ ~~I₃I₃#~~

$\therefore$ $\varepsilon - I_1 (R_1 - R_2) = 0$

$\boxed{I_1 = \dfrac{\varepsilon}{R_1 - R_2}}$

$I_3 R_3 = \varepsilon - I_1 (R_1 - R_2)$

$I_3 R_3 = \cancel{\varepsilon} - \dfrac{\cancel{\varepsilon}}{\cancel{R_1 - R_2}} \cancel{(R_1 - R_2)}$

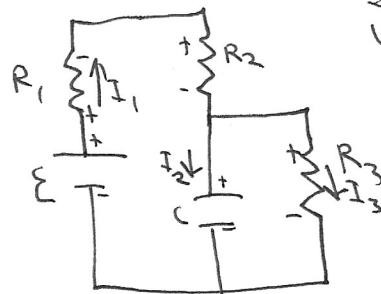$\therefore I_3 = I_2 = 0$ ✓

~~I₃I~~

@ $t = \infty$ $I_2 = 0$

2)b)

$$I_1 = I_2 + I_3$$

C_{left}: $\mathcal{E} - I_1 R_1 - I_1 R_2 - \dfrac{Q}{C} = 0$

C_{right}: $\dfrac{Q}{C} - I_3 R_3 = 0$

C_{tot}: $\mathcal{E} - I_1 R_1 - I_1 R_2 - I_3 R_3 = 0$ —

c)

$$\tau = RC$$

$$RR_{12} = R_1 + R_2 + R_3$$

$$\therefore \boxed{\tau = C(R_1 + R_2 + R_3)}$$

$$\boxed{q(t) = Q_0 e^{-t/RC}}$$

$$Q_0 = Q_{max} = \Delta V \cdot C$$

$$\varepsilon - \Delta V_{R_{12}}$$

$$AND \quad R_{1,2} = R_1 + R_2$$

$$\Delta V_{R_{12}} = I_1(R_1 + R_2)$$

$$\therefore \boxed{Q_0 = \left(\varepsilon - I_1(R_1 + R_2)\right) \cdot C}$$