

Dominik problem set 8

chraea

$$V = iR \quad R = \frac{V}{i}$$

$$P = IV = I^2 R$$

$$7.1 | R = \frac{V(t)}{C(t)} = \frac{56e^{-200t} V}{8 e^{-200t} \text{ nF}} = [2000 \Omega]$$

$$-\frac{1}{RC} = -200 \quad C = \frac{1}{200 \cdot 2000 \Omega} = [14 \times 10^{-5} \text{ F}]$$

$$7.3 | \tau = RC = 50 \mu\text{F} \left((35 \text{ k}\Omega + 25 \text{ k}\Omega) + (40 \text{ k}\Omega)^{-1} \right)^{-1} + 6 \text{ k}\Omega$$

$$[1.5 \times 10^{-6} \text{ s}]$$

$$7.7 | V(0) = 15 \text{ V} \quad C = 2 \text{ mF} \cdot 500 \text{ } \Omega = 1 \text{ k}\Omega \text{ s}$$

$$V(1) = 15 \text{ V} e^{-\frac{1}{1000}} = 15.52 \text{ V}$$

$$V(t) = 15.52 \text{ V} e^{-\frac{t}{1000}} \quad t \geq 1$$

$$C = 2 \text{ mF} \cdot 1 \text{ k}\Omega = 2 \text{ s}$$

$$7.11 | \tau = \frac{L}{R} = \frac{4 \text{ H}}{12 \text{ A}} = 0.33 \text{ s} \quad I_0 = 3.6 \text{ A} \left(\frac{4 \text{ A}}{12 \text{ A}} \right) = 1.2 \text{ A}$$

$$i(t) = I_0 e^{-\frac{t}{\tau}} = 1.2 \text{ A} e^{-\frac{t}{0.33}} \quad t \geq 0$$

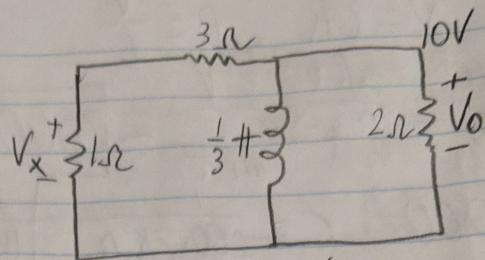
$$7.13 | R = \frac{V(t)}{i(t)} = \frac{80 e^{-10t} \text{ V}}{5 e^{-10t} \text{ mA}} = [16 \text{ k}\Omega]$$

$$10^{-3} = \frac{L}{R} = 10^{-3} \cdot 16 \times 10^3 = [16 \text{ H}]$$

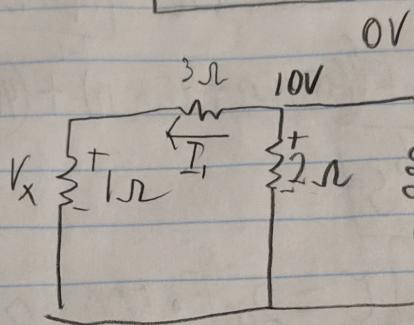
$$C = \frac{16 \text{ H}}{16 \text{ k}\Omega} = [1 \times 10^{-3} \text{ s}]$$

$$P(t) = 16 \text{ k}\Omega (5 \times 10^{-3} e^{-10t} \text{ A})^2$$

7.23



$$i(t) = 7.5A e^{-4t}$$



$$R = 1.3 \Omega$$

$$C = \frac{\frac{1}{3}}{1.3} = 0.255$$

$$I_0 = \frac{10V}{1.3\Omega} = 7.5A$$

Current division for I_1

$$I_1 = i(t) \left(\frac{2\Omega}{6\Omega} \right)$$

$$V_x(t) = I_1 / 1\Omega = (1\Omega) \left(\frac{7.5A}{3} \right) e^{-4t}$$