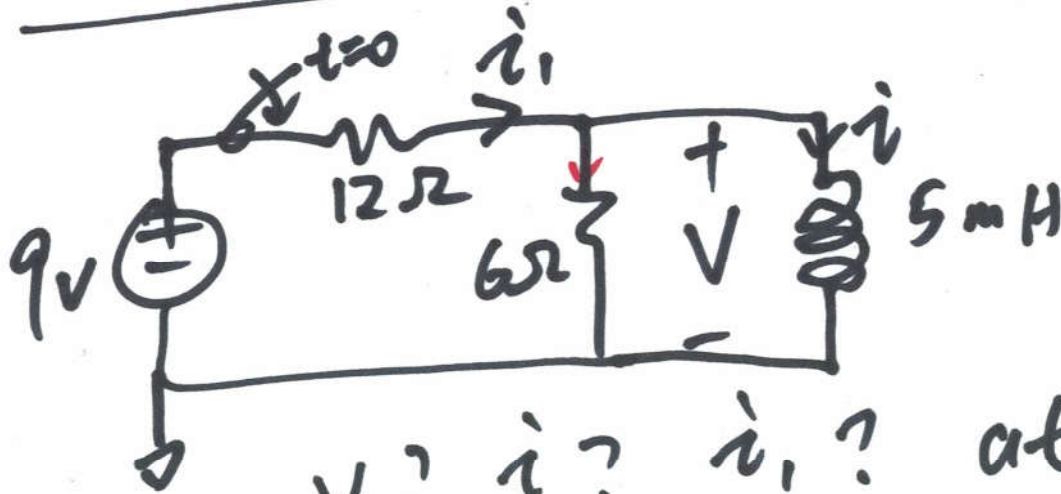
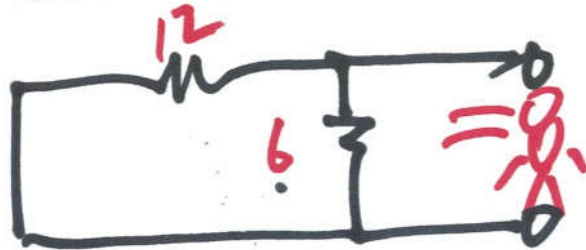


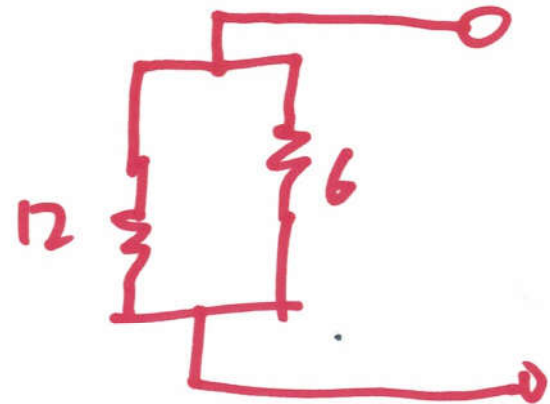
LR circuit examples

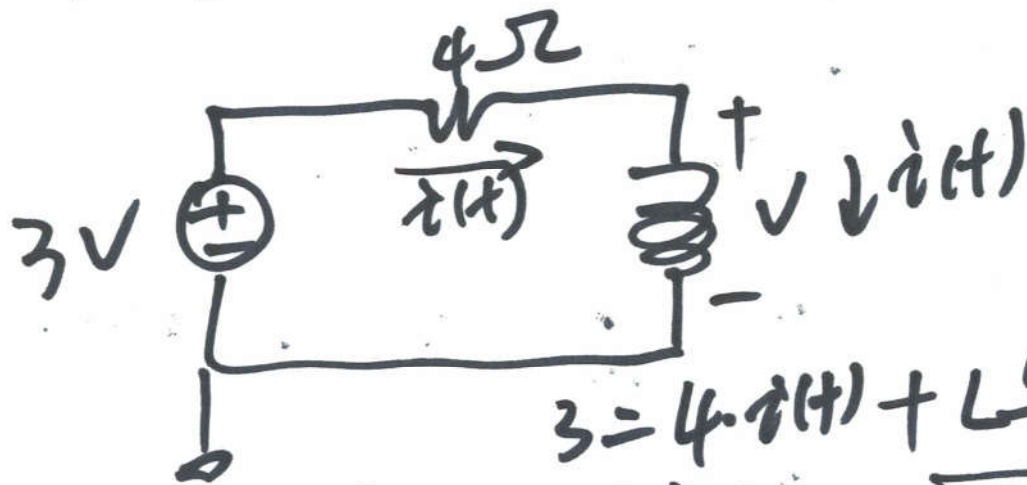
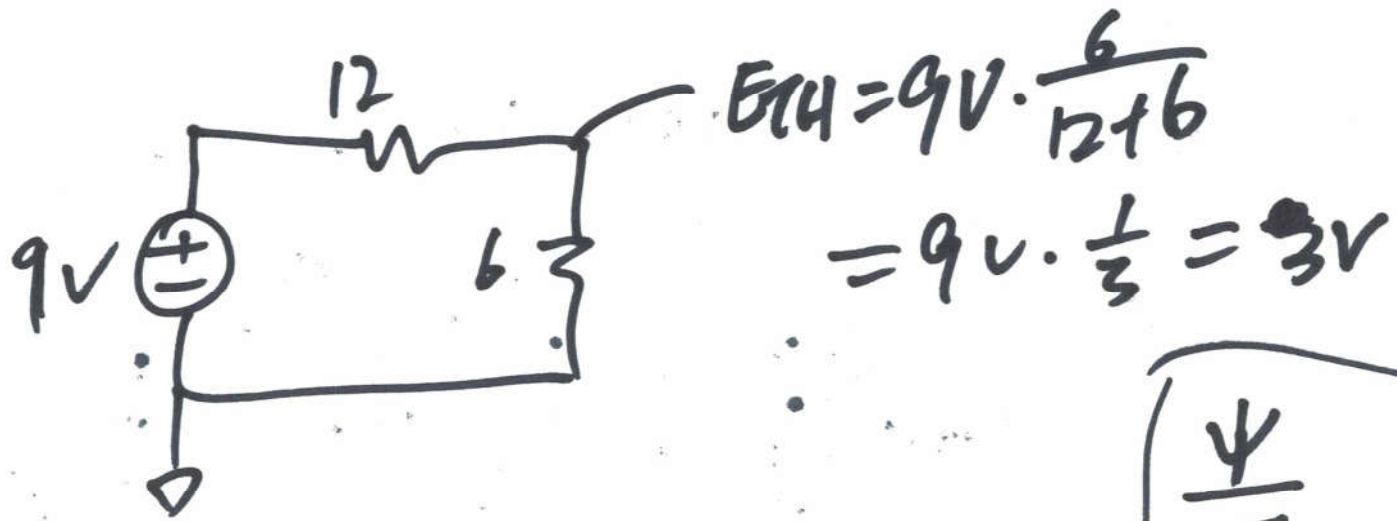


R_{TH} :



$$R_{TH} = 12 \parallel 6 = \frac{12 \cdot 6}{12 + 6} = 4 \Omega$$





$$\frac{1}{L} (3 - 4i(t)) dt = \frac{di(t)}{dt}$$

$$\int_0^t \frac{1}{L} dt = \int_0^{i(t)} \frac{1}{3 - 4i(t)} di(t)$$

$$\frac{\Psi}{C} = \frac{dV(t)}{dt}$$

$$\frac{t}{L} = \frac{1}{4} \int_3^{3-4i(t)} \frac{1}{3-4i(t)} d(3-4i(t))$$

$$-\frac{4}{L}t = \ln \frac{3-4i(t)}{3}$$

$$e^{-\frac{4}{L}t} = 1 - \frac{4}{3}i(t)$$

$$i(t) = \frac{3}{4} \left(1 - e^{-\frac{4}{L}t} \right) \text{ (A)}$$

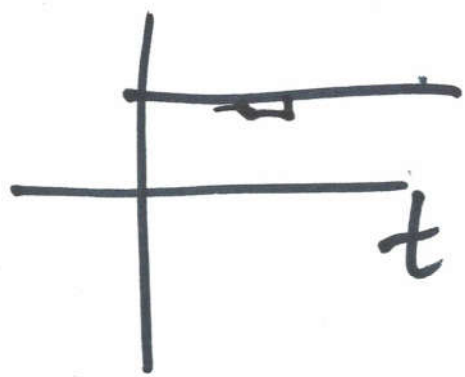
$$= \frac{3}{4} \left(1 - e^{-\frac{4 \times 0.8}{5000}t} \right) \text{ (A)}$$

$$= 0.75 \left(1 - e^{-0.8 \cdot 1000t} \right) \text{ (A)}$$

$$= 0.75 \left(1 - e^{-800t} \right) \text{ (A)}$$

$$\begin{aligned} d(3-4i(t)) \\ = -4di(t) \end{aligned}$$

(3)



$$v(t) = L \frac{di'(t)}{dt}$$

$$= 5 \text{ mH} \cdot \frac{d(0.75 - 0.75 \cdot e^{-800t})}{dt} \quad (\text{V})$$

$$= 5 \cdot 10^{-3} \cdot (0 \pm 0.75 \cdot (-800) \cdot e^{-800t}) \quad (\text{V})$$

$$= 5 \times 10^{-3} \times 0.75 \times 800 \cdot e^{-800t} \quad (\text{V})$$

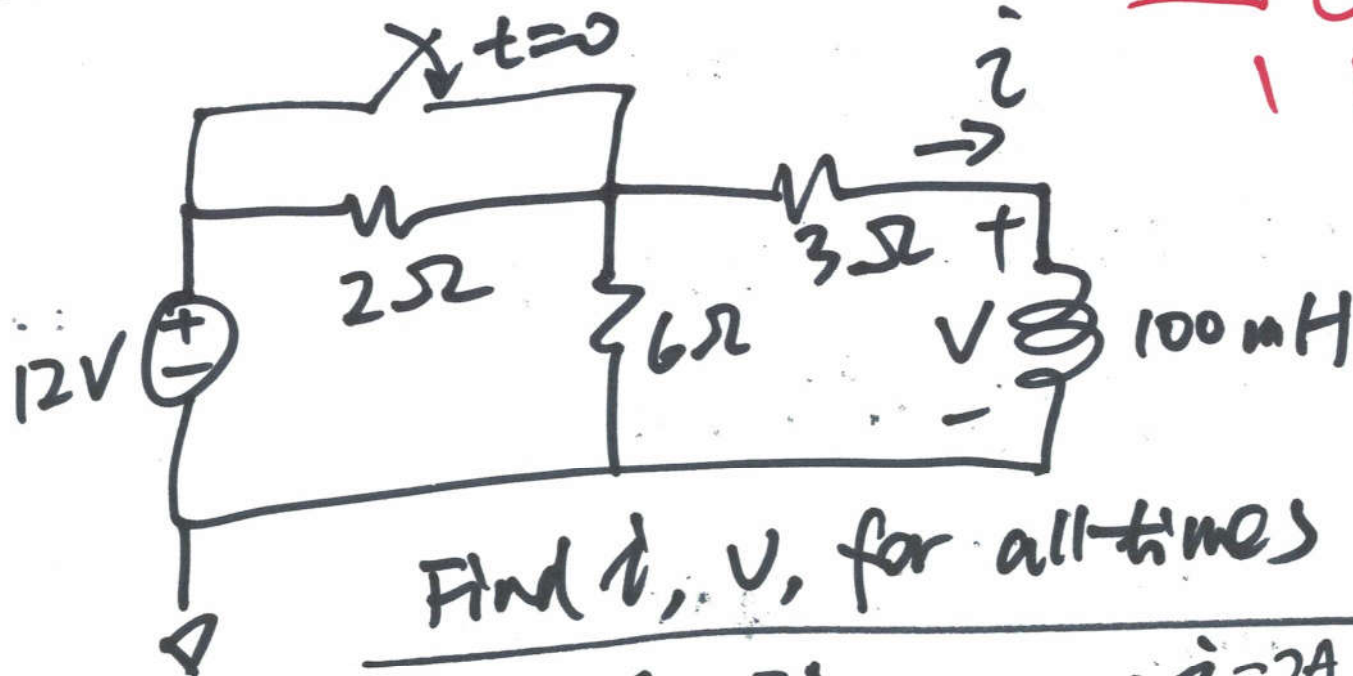
$$= \cancel{3} 3 \cdot e^{-800t} \quad (\text{V})$$

$$i_1 = \frac{9\text{V} - v(t)}{12} = \frac{9 - 3e^{-800t}}{12} \quad (\text{A})$$

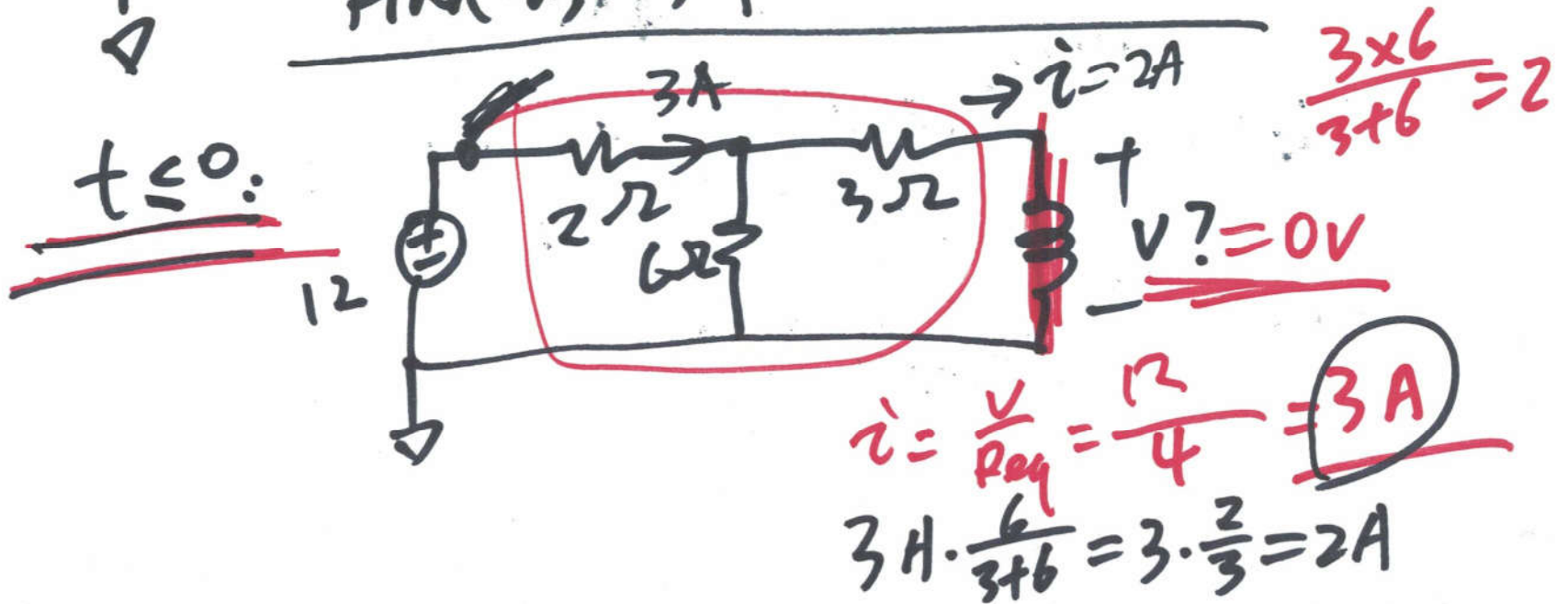
$$= \frac{3}{4} - \frac{1}{4} e^{-800t} \quad (\text{A})$$

(4)

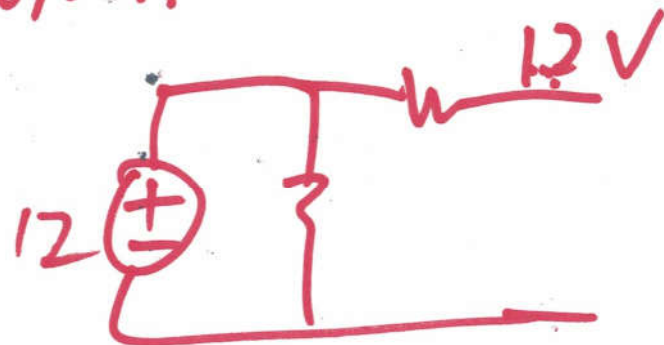
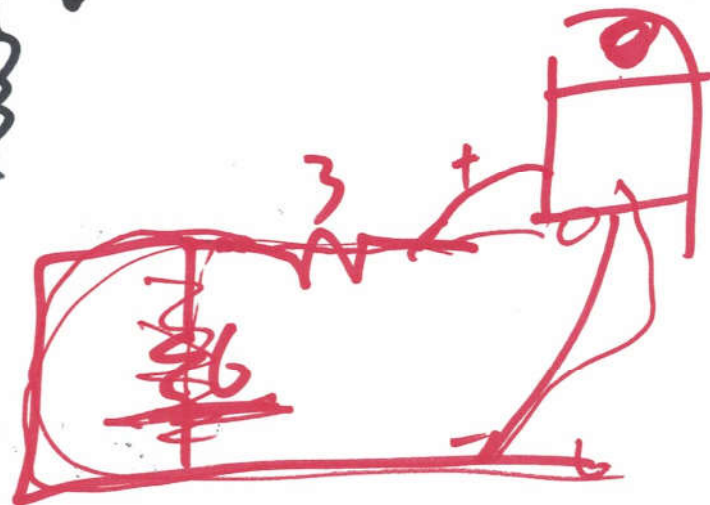
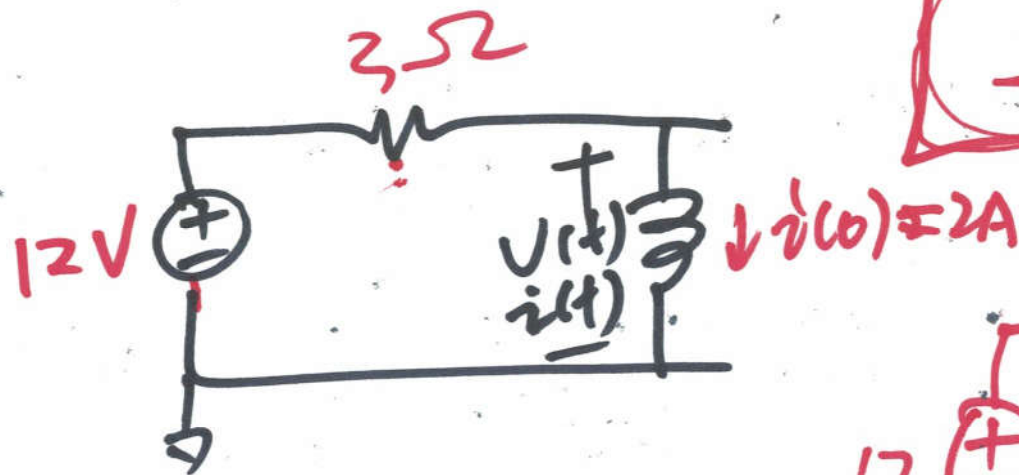
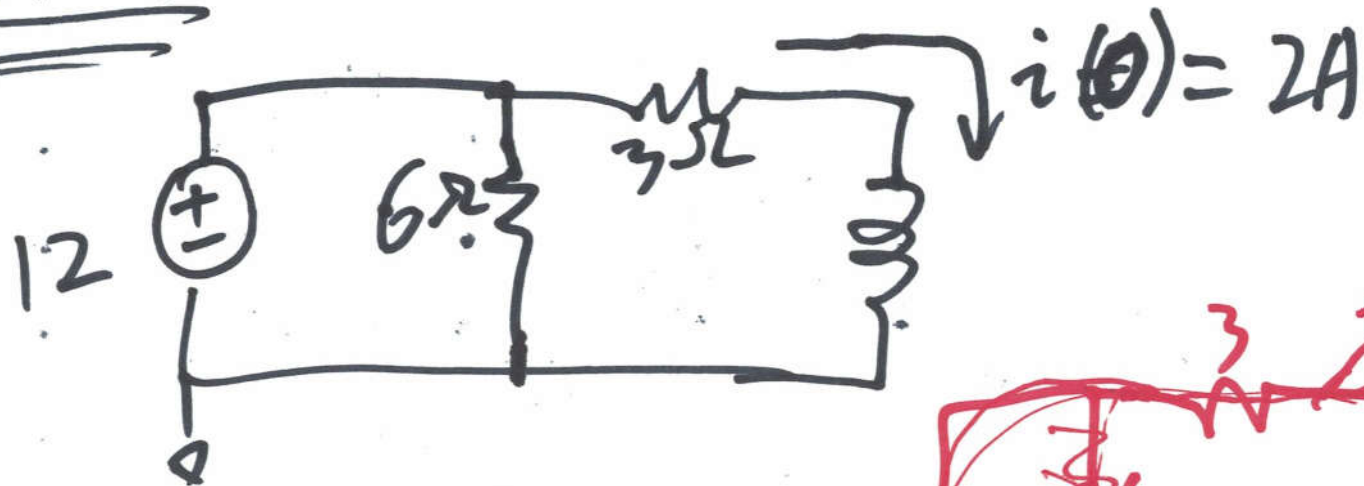
Example 7.9 P153



Find i , v , for all times



$t > 0:$



b)

$$12 = i(t) \cdot 3 + L \frac{di(t)}{dt}$$

$$\frac{1}{L} (12 - i(t) \cdot 3) dt = di(t)$$

$$\int_0^t \frac{1}{L} dt = \int_2^{i(t)} \frac{1}{12 - i(t) \cdot 3} di(t)$$

$$\frac{t}{L} = -\frac{1}{3} \int_6^{12 - i(t) \cdot 3} \frac{1}{12 - i(t) \cdot 3} d(12 - i(t) \cdot 3)$$

$$-\frac{3}{L} t = \ln \frac{12 - i(t) \cdot 3}{6}$$

$$e^{-\frac{3}{L} t} = 2 - 0.5 i(t)$$

①

$$i(t) = 2(2 - e^{-\frac{3}{2}t}) \text{ (A)}$$

~~V(t) = L \frac{di(t)}{dt}~~

$$= 4 - 2e^{-\frac{3}{100m}t} \text{ (A)}$$

$$= 4 - 2e^{-30t} \text{ (A)}$$

$$\frac{1m}{1M} = 10^{-6}$$

$$\frac{1P}{1n} = 10^{-3}$$

$$\frac{1f}{1n} = 1m$$

$$\frac{1M}{1M} = 1$$

$$\begin{aligned} V(t) &= L \frac{di(t)}{dt} \\ &= 100m \cdot \frac{d(4 - 2e^{-30t})}{dt} \\ &= 100 \cdot 10^{-3} \cdot (-2) \cdot (-30) \cdot e^{-30t} \text{ (V)} \\ &= 6 \cdot e^{-30t} \text{ (V)} \end{aligned}$$

⑧