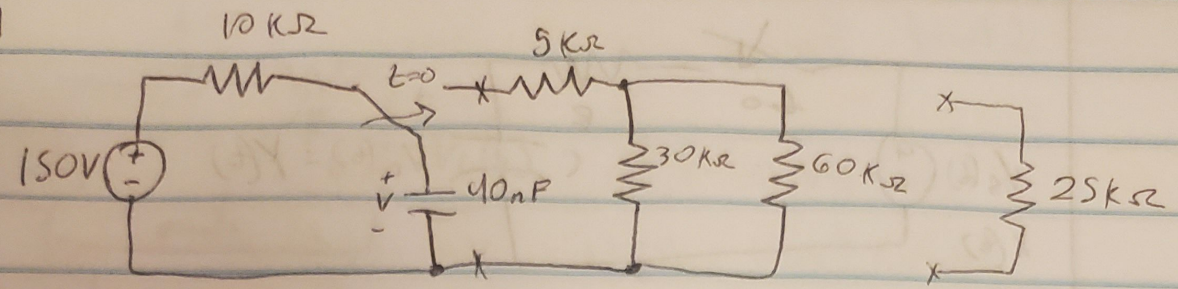
7.21



a) find V_o

$\boxed{150V}$

b) find W_o

$$\left(\tfrac{1}{2}\right)(0.00004)(150)^2 = \boxed{0.45\ J}$$

c) find τ when $t>0$

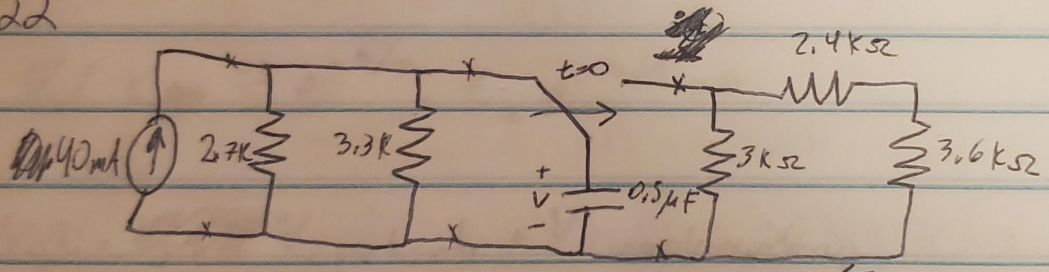
$$(0.00004)(25000) = \boxed{1 \text{ second}}$$

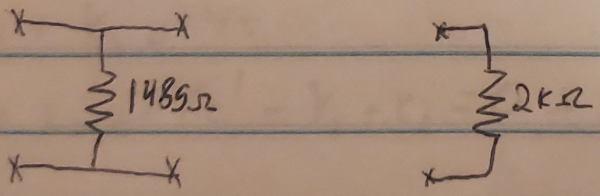
d) find $v(t)$ when $t \geq 0$

$$v(t) = V + (V_o - V)e^{-\frac{t-t_o}{\tau}}$$

$$= \boxed{150e^{-t}V}$$

7.22



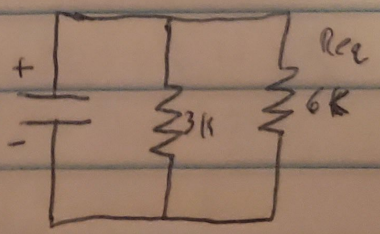


a) find $v(t)$ when $t \geq 0$

$V_o = 59.4V \quad V = 0V \quad \tau = 0.00008$ seconds

$$\boxed{v(t) = 59.4e^{-t/0.00008}\ V}$$

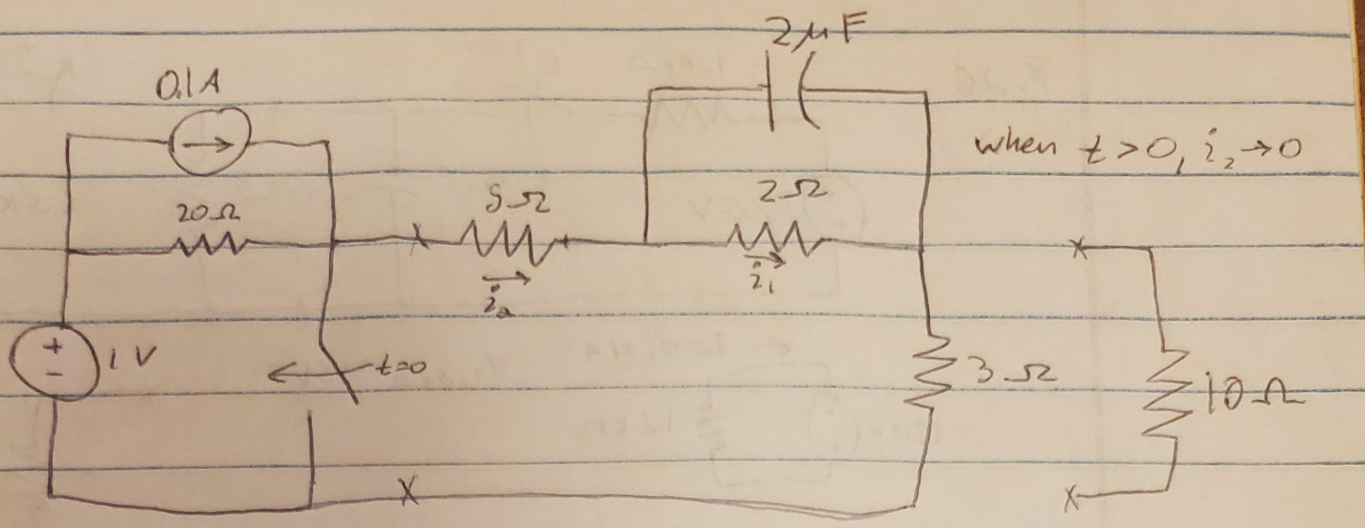
b) find $i(t)$ when $t \geq 0$



$$i(t) = (V' = (59.4)\left(\tfrac{-1}{0.00008}\right)e^{-t/0.00008}$$

$$\boxed{i_{2.4k\Omega}(t) = \frac{v(t)}{R_{eq}} = 0.0099e^{-t/0.00008}}$$

7.25



a) find $i_1(0^-)$ and $i_2(0^-)$

$0.1A$

b) find $i_1(0^+)$ and $i_2(0^+)$

$0.1A > i_2(0^+) > i_1$

c) explain why $i_1(0^-) = i_{c1}(0^+)$

$i_1(t)$ is in parallel with the capacitor

d) explain why $i_2(0^-) = i_2(0^+)$

$i_2(t)$ is in series with the capacitor

e) find $i_1(t)$ when $t \geq 0$

$V_0 = 0.2V \quad V = 0V \quad \tau = 0.004 \text{ sec}$

$v(t) = 0.2e^{-t/0.004} V$

$i_1(t) = \frac{v(t)}{R} = 0.000001e^{-t/0.004} A$

d) find $i_2(t)$ when $t \geq 0$

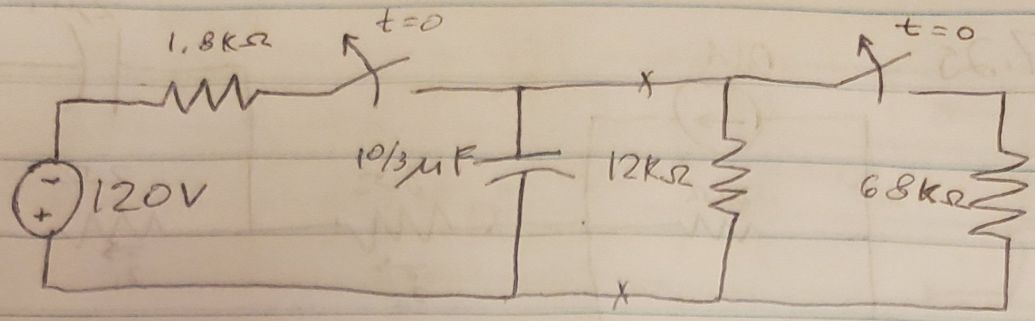
$i(t) = (V' = (0.000002)(0.2)\left(\frac{-1}{0.004}\right)e^{-t/0.004} A$

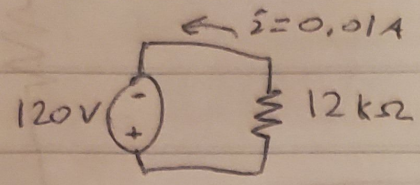
$= -0.0001e^{-t/0.004} A$

$i_2(t) = i_1(t) + i(t)$

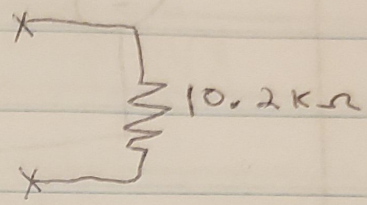
$= -0.000099e^{-t/0.004} A$

7.26





$V_{1.8k\Omega} = 18V$



$V_0 = 102V \quad V = 0 \quad \tau = 0.04 sec$

$v(t) = 102e^{-t/0.04} V$

$w(t) = \left(\frac{1}{2}\right)(0.000001)(10/3)(v(t))^2 J$

$w(0.012) = 0.009516 J$

$W_0 = \left(\frac{1}{2}\right)(0.000001)(10/3)(v(0))^2 = 0.01734 J$

$W_{75\%} = 0.013005 J$

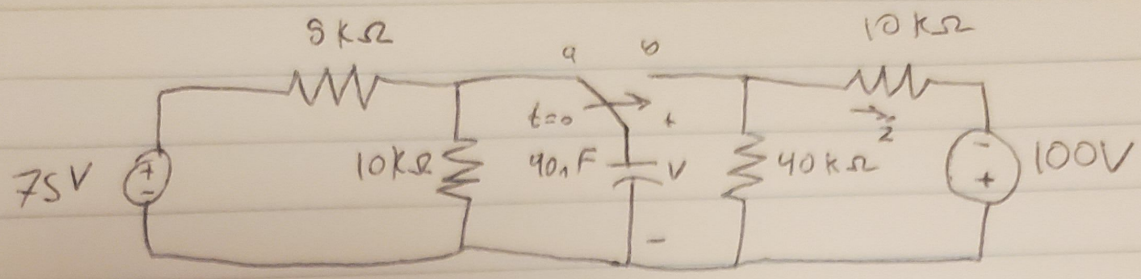
$v(t) = \sqrt{(0.013005)(2)\left(\frac{1}{0.000001}\right)\left(\frac{3}{10}\right)}$

$e^{-t/0.04} = \sqrt{7803}/102$

$-t/0.04 = \ln\left(\sqrt{7803}/102\right) \rightarrow t = -0.04 \ln\left(\frac{\sqrt{7803}}{102}\right)$

$= 0.0058 sec$

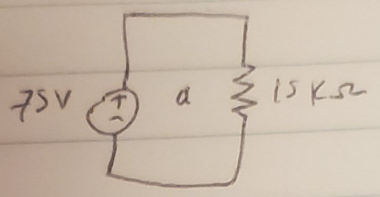
7.52

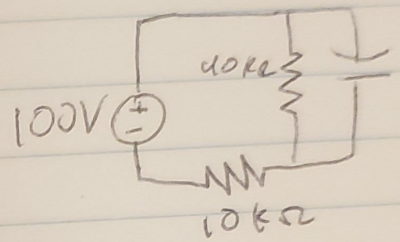


find $V(t)$

$i \rightarrow = 0.005\ A$

$V_{5k\Omega} = 25\ V$





$V_o = 50\ V$ $V =$ [illegible]