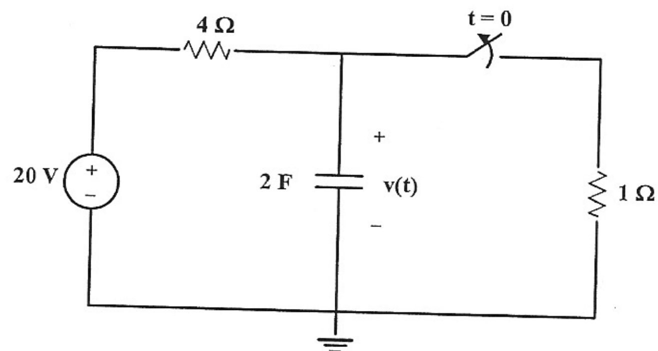
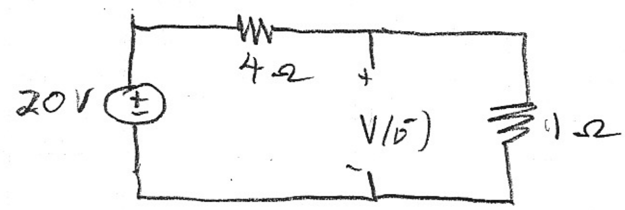
wly

ECE 301
H.W. #6
Fall 2006

(1) You are given the circuit of Figure 1.
(a) Determine $v(0^-)$. Ans 4 V
(b) Determine v(t), $t \geq 0$. Ans $20-16e^{-(t/8)}$ V



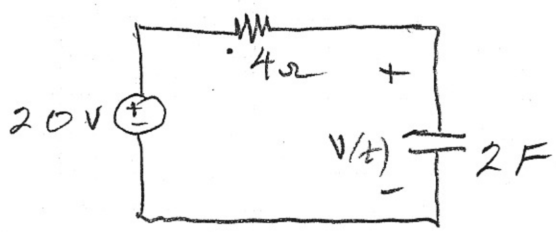
For $t<0$
capacitor is fully charged,



(a)

$$V(0^-) = \frac{20 \times 1}{1+4} = 4\ V$$

(b) For $t>0$



$\tau = RC = 4 \times 2F = 8 sec$

$\tau = 8\mu sec$

$V(0^+) = V(0^-) = 4$

$$V(t) = V(\infty) + [V(0^+) - V(\infty)]e^{-\frac{t}{\tau}}$$

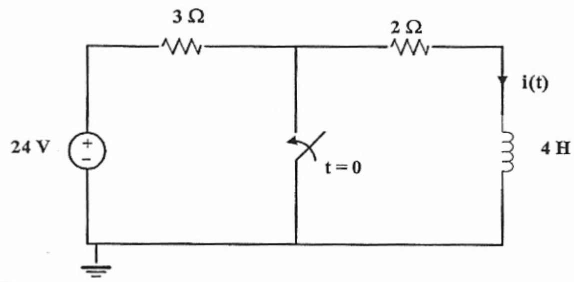
$$V(t) = 20 + [20 - 4]e^{-t/8}$$

$$\boxed{V(t) = [20 + 16e^{-t/8}]\ V \quad u(t)}$$

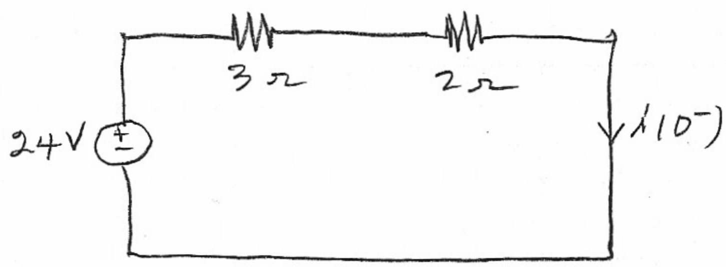
(2) The switch in the circuit of Figure 21 has been open for a very long time. It is closed at t = 0.

(a) Determine $i(0^-)$. Ans: 5 A 4.8

(b) Determine $i(t) \geq 0$. Ans: $5e^{-0.5t}$ A 4.8

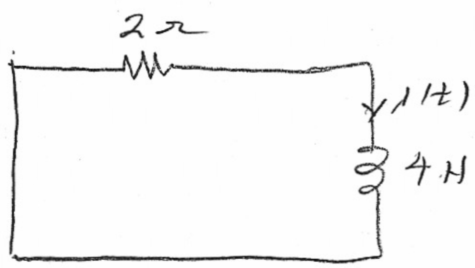


(a) For $t < 0$, circuit appears as



$i(0^-) = \frac{24}{5} = \underline{4.8\ A}$. $\qquad i(0^+) = i(0^-) = 4.8\ A$

(b) For $t > 0$, circuit appears as;



$\tau = \frac{L}{R} = \frac{4}{2} = 2$

$i(t) = i(\infty) + [i(0^+) - i(\infty)]e^{-\frac{t}{\tau}}$

$$\boxed{i(t) = 4.8e^{-\frac{t}{2}}\ A}$$