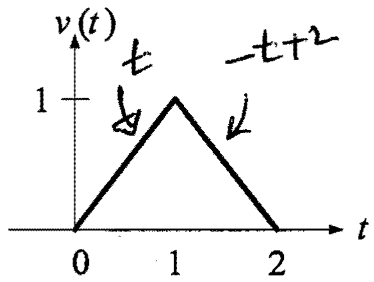
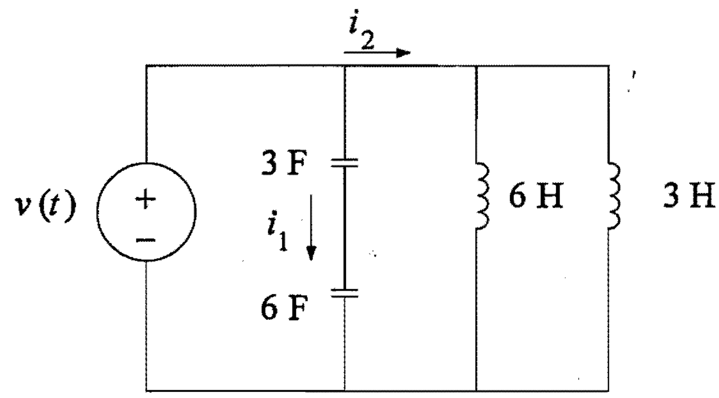
EE 201-06 – Winter 2012(112)
Quiz 5

SER	ID	NAME

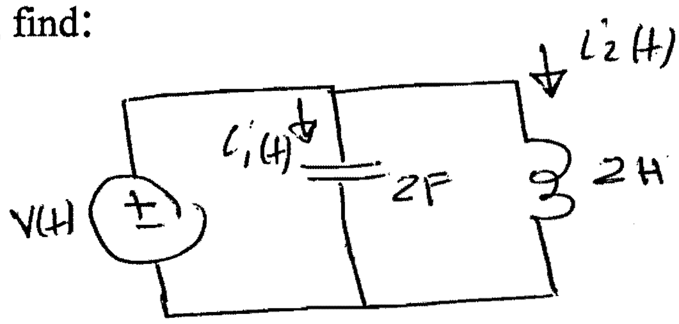




For the circuit shown above, find:

(a) $i_1(t)$?

(b) $i_2(t)$?



(a) $i_1(t) = C\dfrac{dv(t)}{dt} = 2\begin{cases} 1 & 0 \le t \le 1 \\ -1 & 1 \le t \le 2 \end{cases}$

$= \begin{cases} 2 & 0 \le t \le 1 \\ -2 & 1 \le t \le 2 \end{cases}$

$0 \le t \le 1$

$1 \le t \le 2$

(b) $i_2(t) = \dfrac{1}{L}\displaystyle\int_{-\infty}^{t} v(\tau)\,d\tau$

$t \le 0$: $i_2(t) = \dfrac{1}{2}\displaystyle\int_{-\infty}^{0} 0\,d\tau = 0$

$0 < t \le 1$

$$i_2(t) = \frac{1}{2}\int_0^t \tau \, d\tau + \underbrace{i_2(0)}_{= i_2(0^-) = 0}$$

$$= \frac{1}{2}\frac{t^2}{2} + 0 = \frac{t^2}{4}$$

$1 \le t \le 2$

$$i_2(t) = \frac{1}{2}\int_1^t (2-\tau)\, d\tau + \underbrace{i_2(1)}_{i_2(1^-) = \frac{1}{4}}$$

$$= \frac{1}{2}\left[2\tau - \frac{\tau^2}{2}\right]_1^t + \frac{1}{4}$$

$$= -\frac{t^2}{4} + t - \frac{1}{2}$$

$t \ge 2$

$$i_2(t) = \frac{1}{2}\int_2^t 0 \, d\tau + \underbrace{i_2(2)}_{i_2(2^-) = \frac{1}{2}}$$

$$= \frac{1}{2}$$