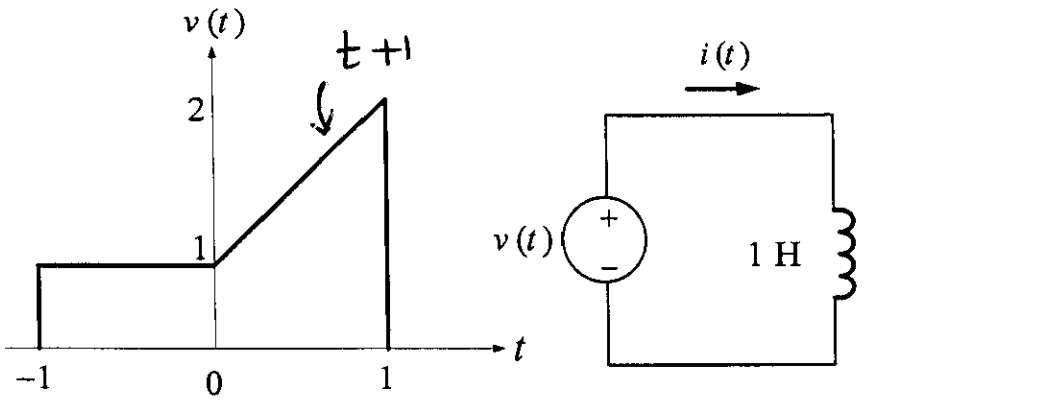
EE 201-01-Winter 2011(102)
QZ4

Sec	Ser	ID	Name	KEY



The voltage across the inductor as shown above , Find the current $i(t)$?

$$i(t) = \frac{1}{L}\int_{-\infty}^{t} v(t')dt'$$

$t < -1 \Rightarrow$ $i(t) = \frac{1}{1}\int_{-\infty}^{t} 0\,dt' = 0$

$-1 \le t \le 0 \Rightarrow$ $i(t) = \frac{1}{1}\int_{-1}^{t} 1\,dt' + \underbrace{\frac{1}{1}\int_{-\infty}^{-1} v(t')dt'}_{=i(-1)=0}$

$= t+1$

$0 \le t \le 1 \Rightarrow$ $i(t) = \frac{1}{1}\int_{0}^{t} (t'+1)\,dt' + \underbrace{\frac{1}{1}\int_{-\infty}^{0} v(t')\,dt'}_{= i(0) = \int_{-1}^{0} 1\,dt' = 1}$

$= \frac{t'^2}{2} + t'\Big|_0^t + 1$

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

continue ⇒

$t \geq 1 \quad \Rightarrow \quad l'(t) = \frac{1}{1}\int_{1}^{t} 0 \cdot dt' + \frac{1}{1}\int_{-\infty}^{1} v(t')dt'$

$= l'(1) = \frac{1}{1}\int_{-1}^{1} v(t')dt$

$= \frac{5}{2}$

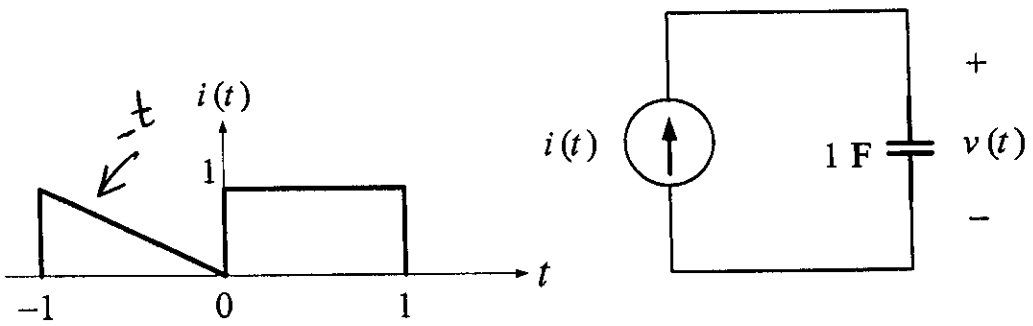
$= \frac{5}{2}$

$= \frac{5}{2}$

$$l'(t) = \begin{cases} 0 & t \leq -1 \\ t+1 & -1 \leq t \leq 0 \\ \frac{t^2}{2} + t + 1 & 0 \leq t \leq 1 \\ \frac{5}{2} & t \geq 1 \end{cases}$$

EE 201-02-Winter 2011(102)
QZ4

Sec	Ser	ID	Name KEY



The current through the capacitor as shown above , Find the voltage $v(t)$?

$$v(t) = \frac{1}{C}\int_{-\infty}^{t} i(t')\,dt'$$

$$t \le -1 \Rightarrow v(t) = \frac{1}{1}\int_{-\infty}^{t} 0\cdot dt' = 0$$

$$-1 \le t \le 0 \Rightarrow v(t) = \frac{1}{1}\int_{-1}^{t} -t'\,dt' + \frac{1}{1}\underbrace{\int_{-\infty}^{-1} i(t')\,dt'}_{v(-1)=0}$$

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

$$0 \le t \le 1 \Rightarrow v(t) = \frac{1}{1}\int_{0}^{t} 1\,dt' + \frac{1}{1}\underbrace{\int_{-\infty}^{0} i(t')\,dt'}_{=v(0)=\int_{-1}^{0} -t'\,dt' = \frac{1}{2}}$$

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

Continue ⇒

$$t \geq 1 \quad \Rightarrow \quad v(t) = \frac{1}{1}\int_{1}^{t} 0 \cdot dt' + \underbrace{\frac{1}{1}\int_{-\infty}^{1} i(t')dt'}_{= v(1) = \frac{1}{1}\int_{-1}^{1} i(t')dt'}$$

$$= \frac{3}{2}$$

$$v(t) = \begin{cases} 0 & t \leq -1 \\ \frac{1-t^2}{2} & -1 \leq t \leq 0 \\ t + \frac{1}{2} & 0 \leq t \leq 1 \\ \frac{3}{2} & t \geq 1 \end{cases}$$