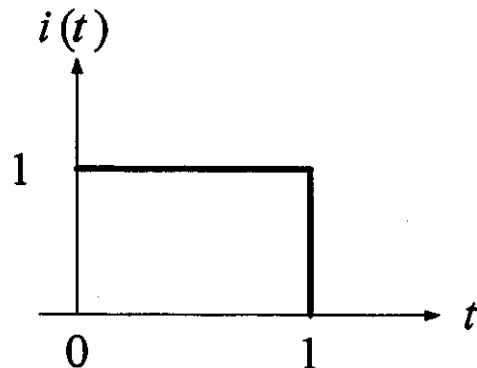
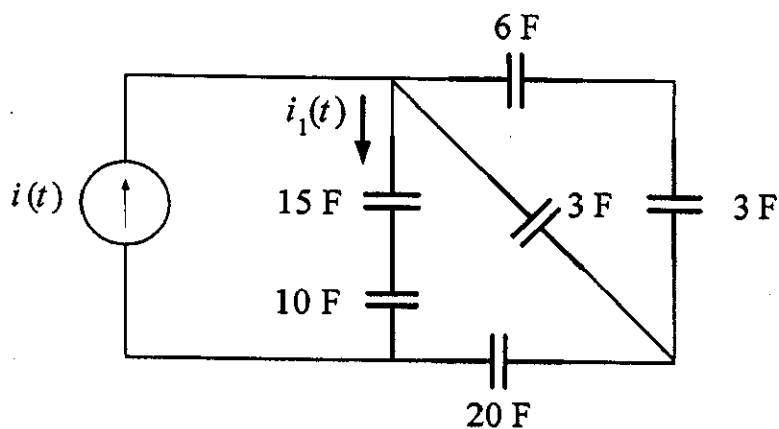


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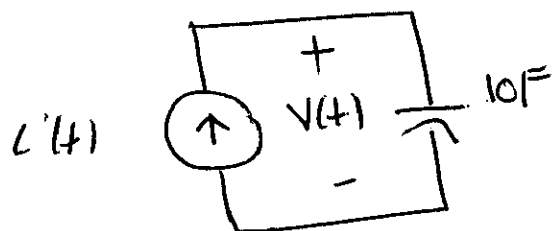
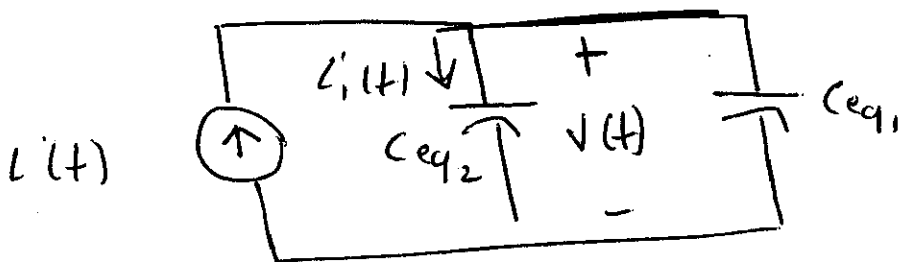


For the circuit shown above find $i_1(t)$ and plot it?

$$C_{eq1} = [(6 \parallel 3) + 3] \parallel 20 = [2 + 3] \parallel 20 = 4 F$$

$$C_{eq2} = (15 \parallel 10) = 6 F$$

$$C_{eq} = C_{eq1} + C_{eq2} = 4 + 6 = 10$$



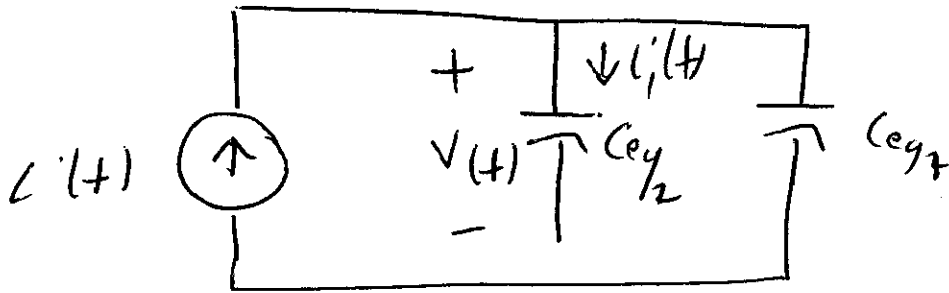
$$V(t) = \frac{1}{C} \int_{-\infty}^t i'(t) dt$$

$$t < 0 \quad i'(t) = 0 \Rightarrow V(t) = 0$$

$$0 \leq t \leq 1 \quad V(t) = \frac{1}{10} \int_0^t 1 dt = \frac{t}{10}$$

$$t \geq 1 \quad V(t) = \frac{1}{10} \int_0^1 1 dt + \frac{1}{10} \int_1^t 0 dt = \frac{1}{10}$$

$$v(t) = \begin{cases} 0 & t < 0 \\ \frac{t}{10} & 0 \leq t \leq 1 \\ \frac{1}{10} & t \geq 1 \end{cases}$$



$$i_1(t) = C_{eq2} \frac{dv(t)}{dt} = 6 \frac{d}{dt} \begin{cases} 0 & t < 0 \\ \frac{t}{10} & 0 \leq t \leq 1 \\ \frac{1}{10} & t \geq 1 \end{cases}$$

$$= 6 \begin{cases} 0 & t < 0 \\ \frac{6}{10} & 0 \leq t \leq 1 \\ 0 & t \geq 1 \end{cases}$$