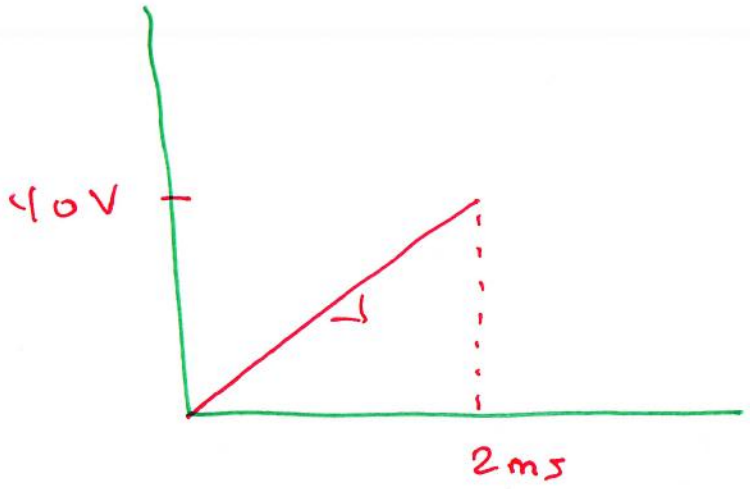

$$\frac{dv}{dt} = \text{slope} = \frac{40}{2\times10^{-3}} = 20\times10^{3} = 20000\ \frac{V}{s}$$

$$C\frac{dv}{dt} = 5\times10^{-5} \times 20000 = 1 = i_c(t)$$

$$-40\times10^{+3} \times 5\times10^{-5} = -2$$

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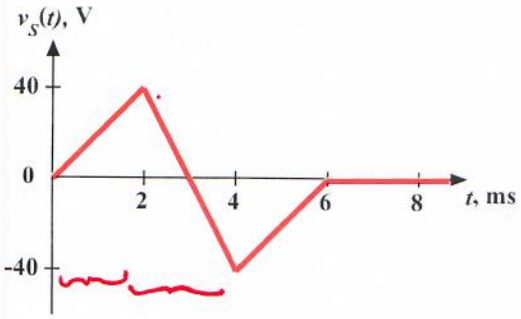
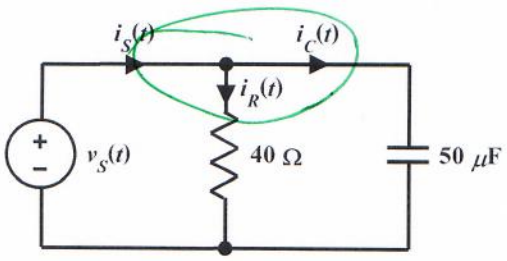
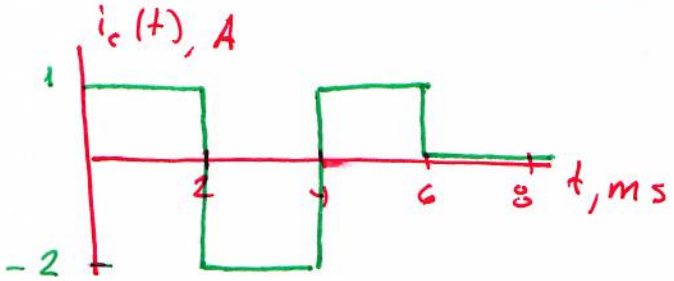
Homework Problem #040





The independent voltage source is described by the plot shown.

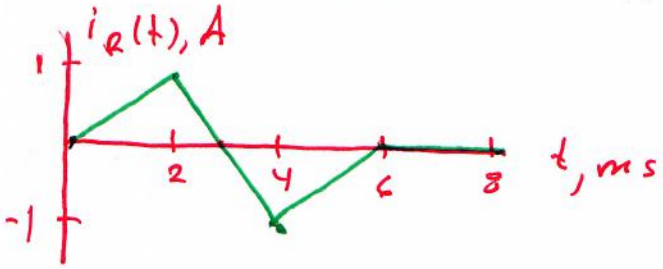
a. Accurately sketch the waveform for the capacitor current, $i_C(t)$.



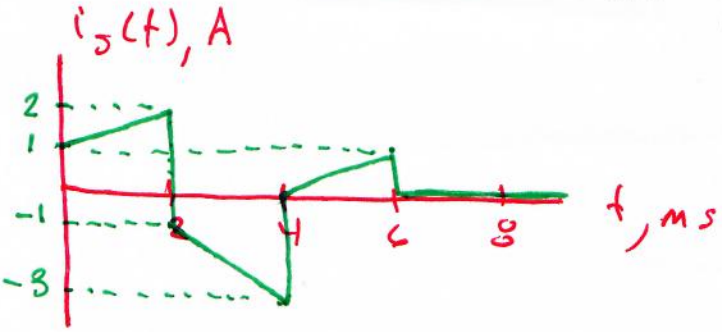
$i_c(t) = C \frac{dv_s}{dt}$

$50\,mF = 5 \times 10^{-5}\,F$

b. Accurately sketch the waveform for the resistor current, $i_R(t)$.



c. Accurately sketch the waveform for the source current, $i_S(t)$.



$i_s(t) = i_R(t) + i_c(t)$

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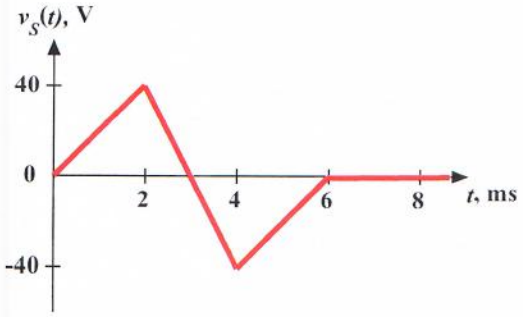
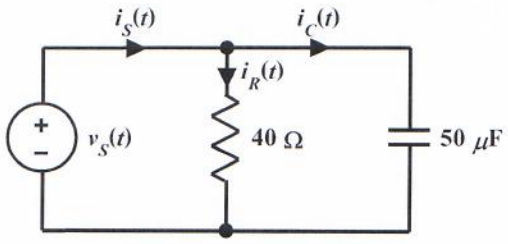
Homework Problem #041

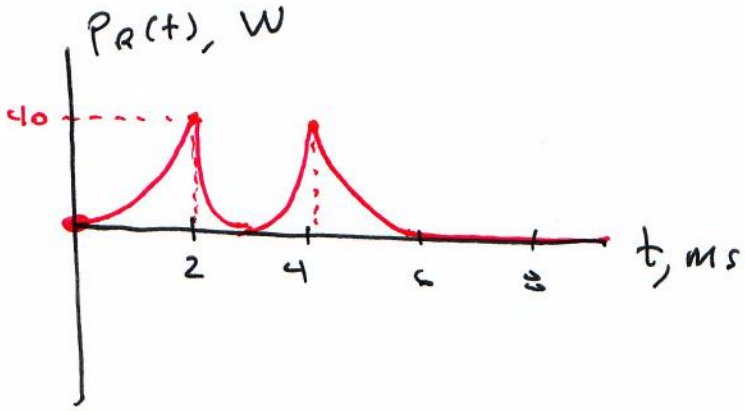




The circuit and source voltage are the same as those in Homework Problem #040.

a. Accurately sketch the waveform for the power absorbed by the resistor.

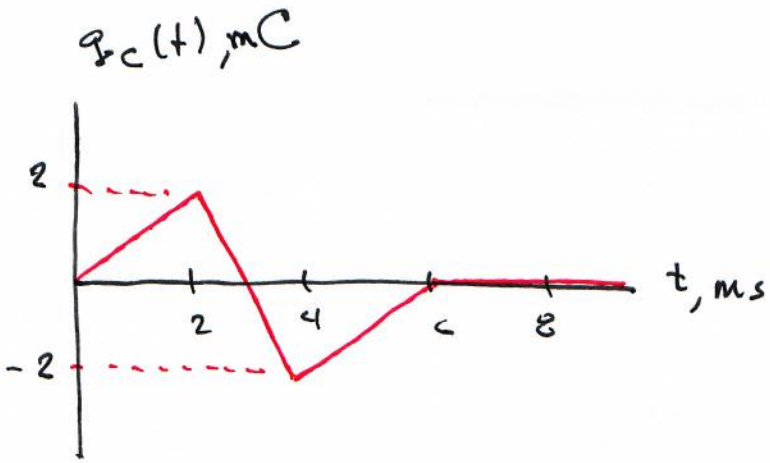
$P_R = v_S(t)\, i_R(t)$



b. Accurately sketch the waveform for the capacitor charge, $q_C(t)$.

$q_C(t) = C\, v_S(t)$

C: 50×10^{-6} F or 5×10^{-5} F



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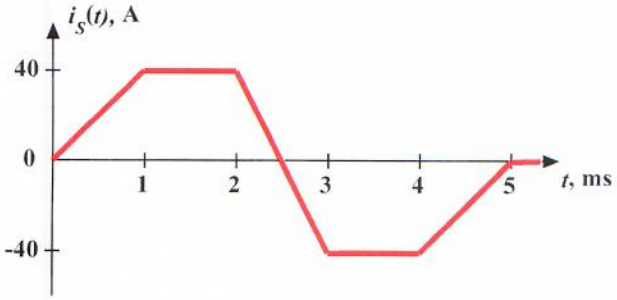
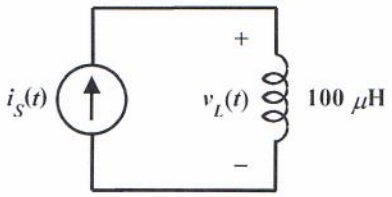
Homework Problem #042



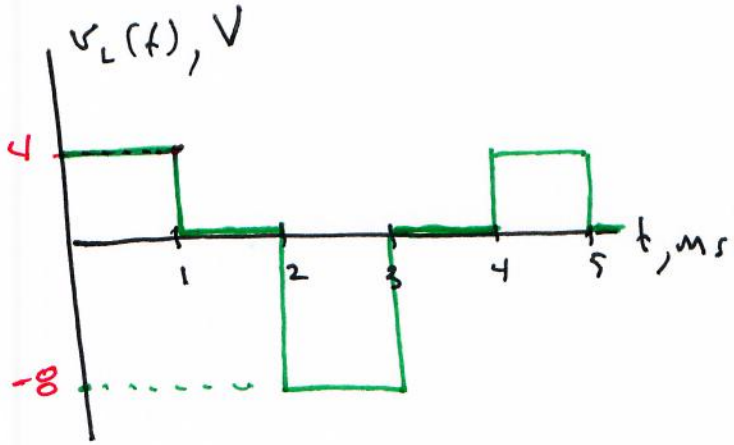


The independent current source is described by the plot shown.

a. Accurately sketch the waveform for the voltage, $v_L(t)$.

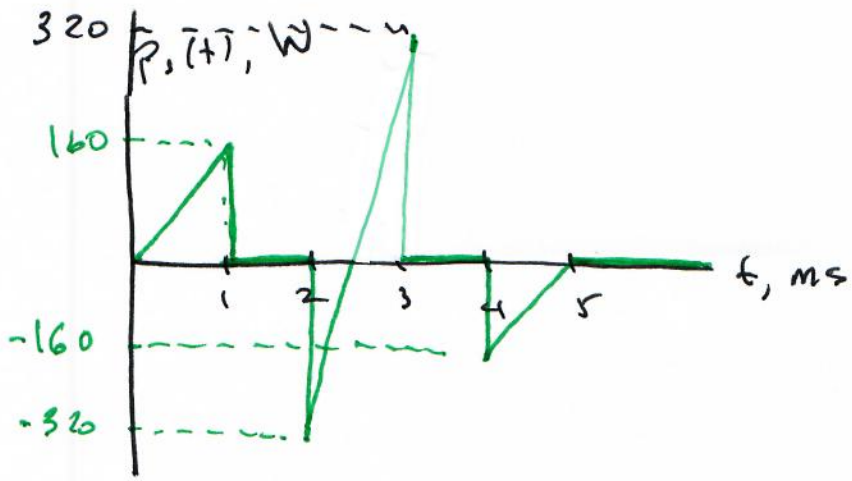
$$v_L(t) = L\frac{di}{dt}$$

$$L = 100 \times 10^{-6} = 10^{-4}\ H$$



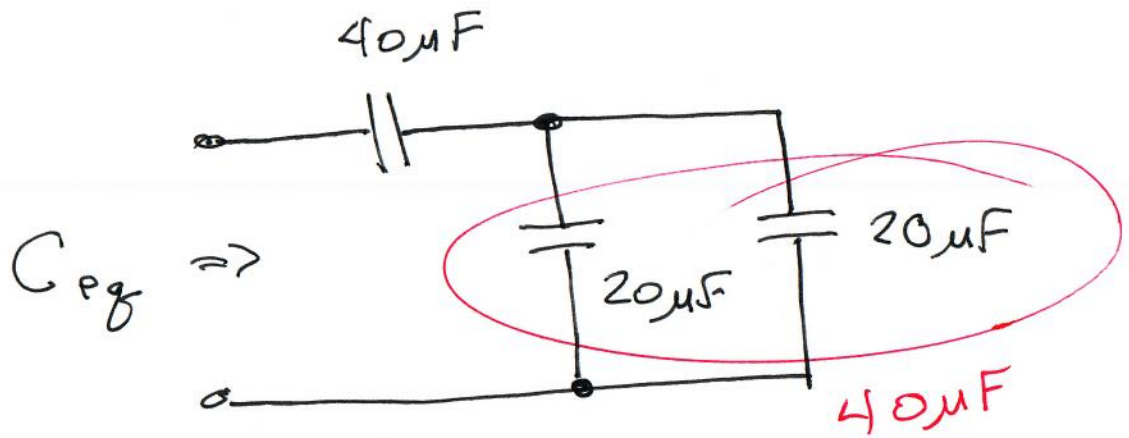
b. Accurately sketch the waveform for the power delivered by the independent current source.

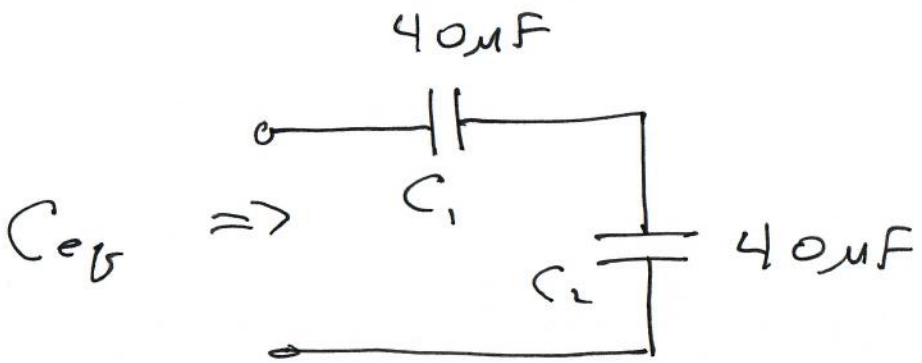
$$p_s(t) = i_s(t)\, v_L(t)$$



$$\frac{di_L}{dt} = \frac{40}{1 \times 10^{-3}} = 40000 \ \frac{A}{s}$$

$$v_L = L \frac{di_L}{dt} = 10^{-4} \times 40000 = 4 \ V$$





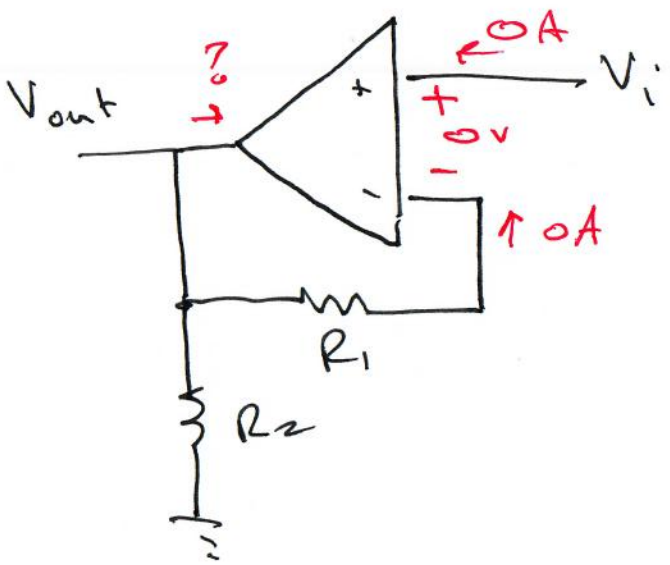
$$\frac{1}{40\mu F} + \frac{1}{40\mu F} = \frac{1}{C_{eq}}$$

$$\frac{2}{40\mu F} = \frac{1}{C_{eq}}$$

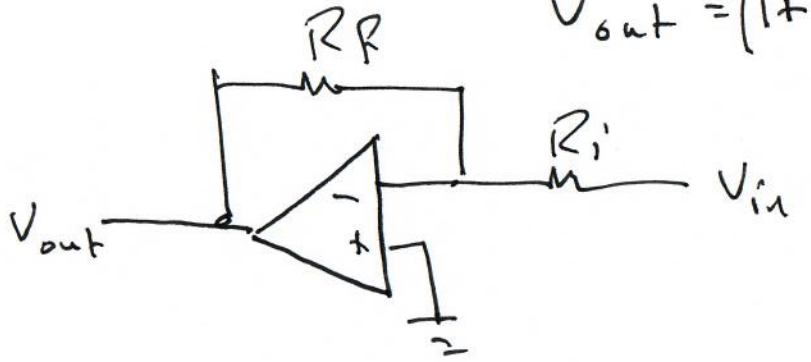
$$C_{eq} = 20\mu F$$

$$\frac{1}{C_1} + \frac{1}{C_2} = \frac{1}{C_{eq}}$$

$$C_{eq} = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2}} = \frac{C_1 C_2}{C_2 + C_1}$$



$$V_{out} = \left(1 + \frac{R_1}{R_2}\right) V_i$$



$$V_{out} = -\frac{Rf}{Ri} V_{in}$$

Microsim

PSPICE Lite (OrCAD)

Simulation Program with Integrated Circuit Emphasis

Personal Computer

Cadence