

EJERCICIO CLASE DEL MIERCOLES

7.11 For the circuit in Fig. 7.91, find i_o for $t > 0$.

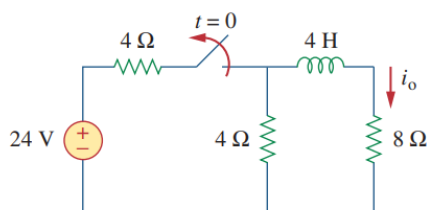
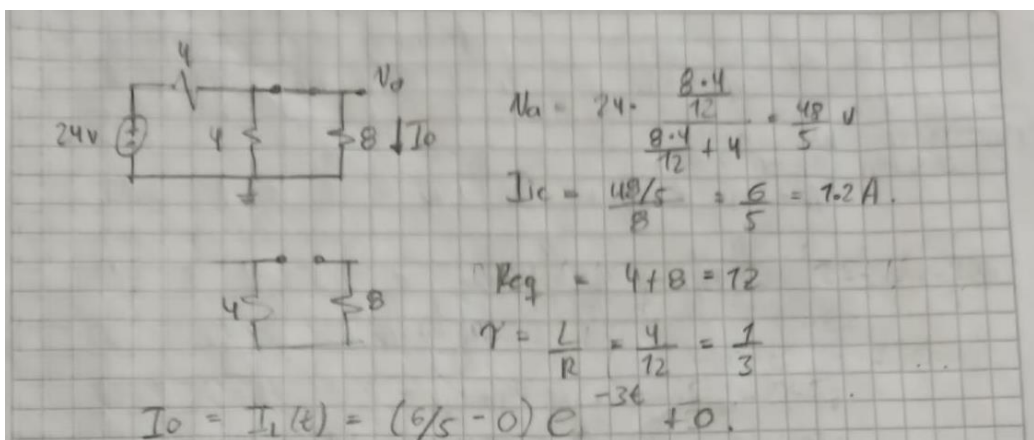


Figure 7.91

For Prob. 7.11.



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7.19 In the circuit of Fig. 7.99, find $i(t)$ for $t > 0$ if $i(0) = 6$ A.

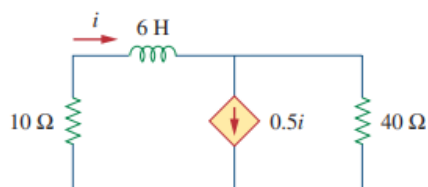
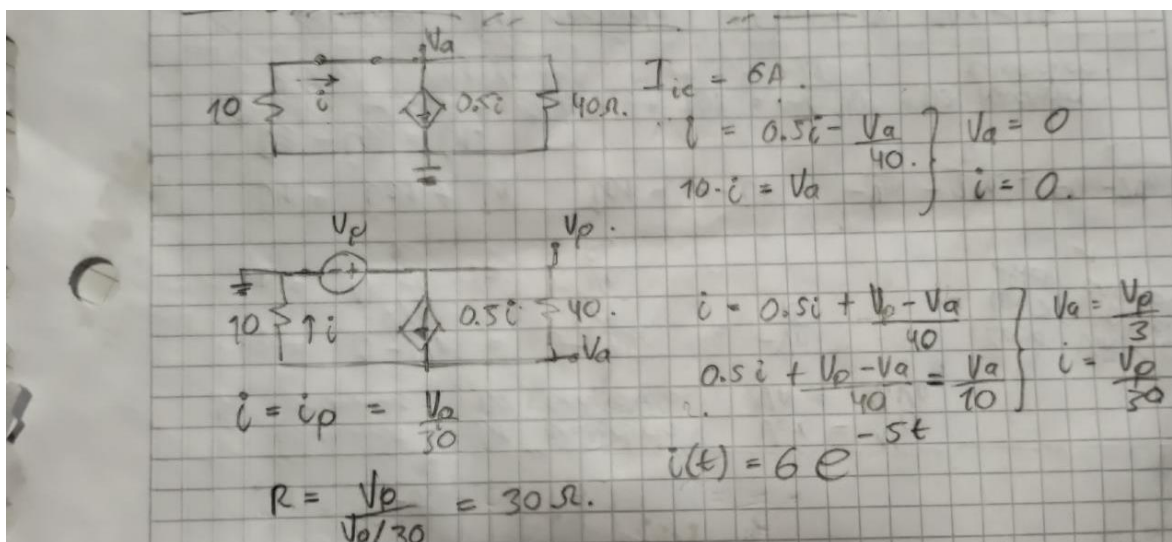
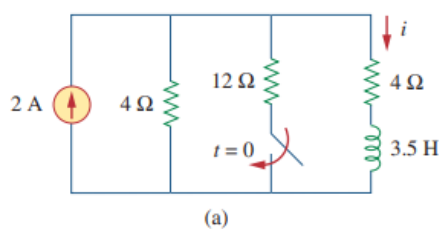


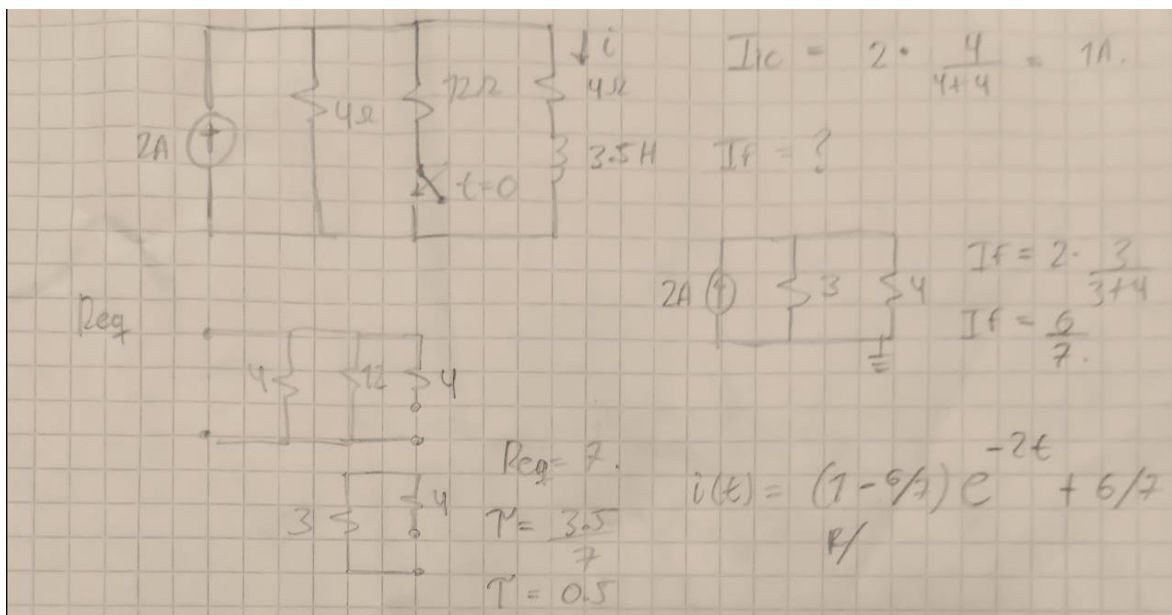
Figure 7.99
For Prob. 7.19.



EJERCICIO CLASE DEL MIERCOLES

7.54 Obtain the inductor current for both $t < 0$ and $t > 0$ in each of the circuits in Fig. 7.120.





EJERCICIO CLASE DEL VIERNES

Determine the rms value of the current waveform in Fig. 11.14. If the current is passed through a $2\text{-}\Omega$ resistor, find the average power absorbed by the resistor.

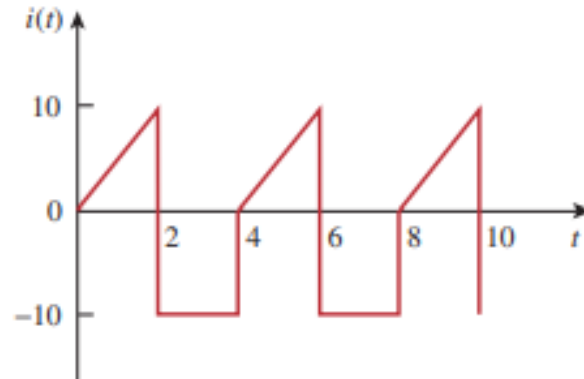


Figure 11.14
For Example 11.7.

Handwritten solution for the rms value of the current waveform:

The waveform is periodic with a period $T = 8$ s. The current is zero for $0 \leq t < 2$ and $4 \leq t < 6$. It increases linearly from 0 to 10 A over the interval $2 \leq t < 4$ and decreases linearly from 10 A to -10 A over the interval $4 \leq t < 6$. The average value of the current is $M = \frac{10}{2} = 5.6$.

The rms value is calculated as follows:

$$I_{\text{rms}} = \sqrt{\frac{1}{T} \int_0^T i^2 dt}$$

$$I_{\text{rms}} = \sqrt{\frac{1}{4} \int_0^4 i^2 dt}$$

$$I_{\text{rms}} = \sqrt{\frac{1}{4} \left[\frac{25t^3}{3} \right]_0^4}$$

$$I_{\text{rms}} = \sqrt{\frac{1}{4} \left[\frac{200}{3} \right]}$$

$$I_{\text{rms}} = \sqrt{\frac{50}{3}} = \frac{5\sqrt{6}}{3}$$

The rms value of the negative half-cycle is:

$$I_{\text{rms}} = \sqrt{\frac{1}{T} \int_4^8 (-10)^2 dt}$$

$$I_{\text{rms}} = \sqrt{\frac{1}{4} \int_2^4 -10 dt}$$

$$I_{\text{rms}} = \sqrt{\frac{1}{4} \left[100t \right]_2^4}$$

$$I_{\text{rms}} = \sqrt{\frac{1}{4} [400 - 200]}$$

$$I_{\text{rms}} = \sqrt{50}$$

$$I_{\text{rms}} = 5\sqrt{2}$$

The total rms value is:

$$I_{\text{rms}} = \sqrt{\left(\frac{5\sqrt{6}}{3} \right)^2 + (5\sqrt{2})^2} = \frac{10\sqrt{6}}{3} = 8.165 \text{ A}$$

The average power absorbed by the resistor is:

$$P = I_{\text{rms}}^2 \cdot R = \frac{400}{3} = 133.3 \text{ W}$$

EJERCICIO CLASE DEL VIERNES

6.73 Show that the circuit in Fig. 6.90 is a noninverting integrator.

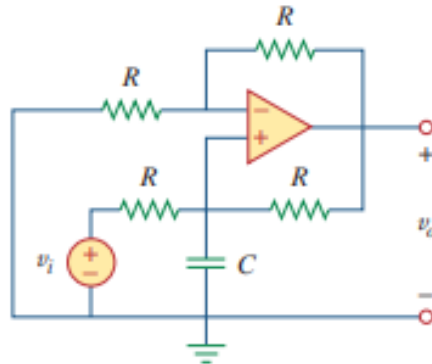


Figure 6.90

For Prob. 6.73.

Handwritten solution for problem 6.73:

Circuit diagram: An op-amp with non-inverting input (+) connected to a voltage divider (two resistors R) with input voltage v_i . The inverting input (-) is connected to the output v_o through a resistor R and to ground through a capacitor C. The output v_o is also connected back to the non-inverting input through a resistor R.

Equations:

$$\frac{0 - v_c}{R} = \frac{v_c - v_o}{R} \quad i_c = C \frac{dv_c}{dt}$$

$$\frac{v_i - v_c}{R} = C \frac{dv_c}{dt} + \frac{v_c - v_o}{R}$$

$$-2v_c = -v_o \quad v_c = \frac{v_o}{2}$$

$$\frac{v_i}{R} - \frac{v_o}{2R} = \frac{C}{2} \frac{dv_o}{dt} + \frac{v_o}{2R} - \frac{v_o}{R}$$

$$\frac{2v_i}{CR} = \frac{dv_o}{dt} \quad \frac{v_i}{R} + \frac{v_o}{R} \left(-\frac{1}{2} - \frac{1}{2} + 1 \right) = \frac{C}{2} \frac{dv_o}{dt}$$

$$v_o = \frac{2}{CR} \int v_i dt$$

EJERCICIO CLASE DEL VIERNES

6.69 An op amp integrator with $R = 4\text{ M}\Omega$ and $C = 1\text{ }\mu\text{F}$ has the input waveform shown in Fig. 6.88. Plot the output waveform.

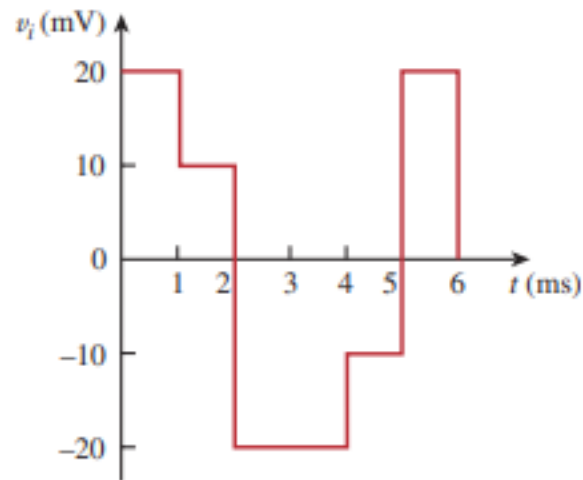


Figure 6.88
For Prob. 6.69.

