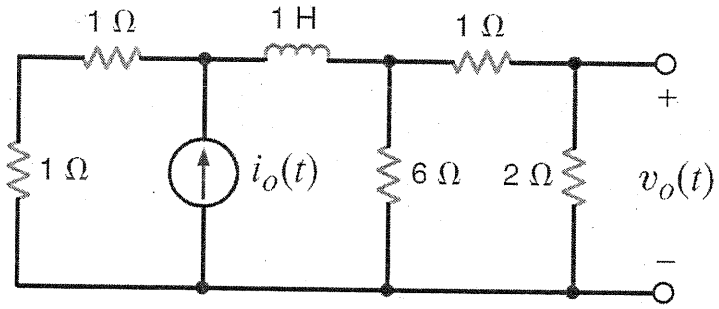
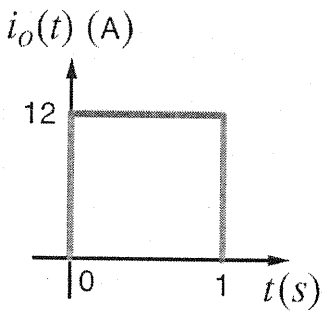
**14.42** Find the output voltage, $v_o(t)$, $t > 0$, in the network in Fig. P14.42a if the input is represented by the waveform shown in Fig. P14.42b.




(a)




(b)

***Figure P14.42***

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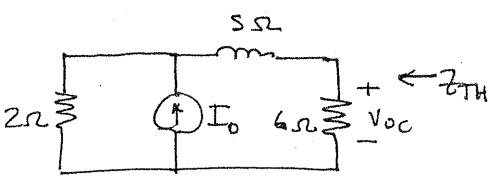
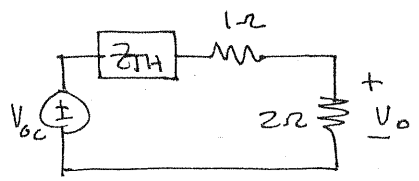
SOLUTION: $i_o(t) = 12u(t) - 12u(t-1)$ A $\Rightarrow$ $I_o(s) = \frac{12}{s}(1 - e^{-s})$ A

Use Thevenin Eq:




$$V_{oc} = I_o\left[\frac{2(6)}{s+8}\right] = I_o\left(\frac{12}{s+8}\right)$$

$$Z_{TH} = \frac{6(s+2)}{s+8}$$




$$V_o = V_{oc}\left(\frac{2}{3+Z_{TH}}\right) = I_o\left[\frac{24}{3(s+8)+6(s+2)}\right]$$

$$V_o = I_o\left[\frac{24}{9s+36}\right] = \frac{(8/3)(12)}{s(s+4)}(1-e^{-s})$$

$$V_o = \left(\frac{8}{s} - \frac{8}{s+4}\right)(1-e^{-s})$$

$$v_o(t) = \left[8 - 8e^{-4t}\right]u(t) - \left[8 - 8e^{-4(t-1)}\right]u(t-1) \quad V$$