Practice Problem 8.10

For $t > 0$, obtain $v_o(t)$ in the circuit of Fig. 8.32. (*Hint:* First find v_1 and v_2.)

Answer: $14(e^{-t} - e^{-6t})$ V, $t > 0$.

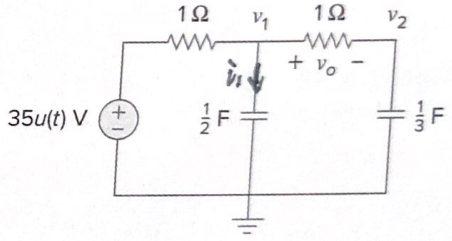

Figure 8.32
For Practice Prob. 8.10.

① $v_1(0) = 0$, $v_2(0) = 0$

$i_1(0^+) = 35 - 0 = 35$

$v_1'(0) = 35/C = 70$

$v_1(\infty) = 35$

② natural response

$$\begin{cases} -v_1 = \frac{1}{2}v_1' + v_1 - v_2 \\ v_1 - v_2 = \frac{1}{3}v_2' \end{cases}$$

$$\Rightarrow v_1'' + 7v_1' + 6v_1 = 0 \Rightarrow \begin{cases} s_1 = -1 \\ s_2 = -6 \end{cases}$$

③ complete response $v_1 = Ae^{-t} + Be^{-6t} + 35$

④ solve A & B: $\begin{cases} A + B + 35 = 0 \\ -A - 6B = 70 \end{cases} \Rightarrow \begin{cases} A = -28 \\ B = -7 \end{cases}$

⑤ $v_o = 35 - v_1 - \frac{1}{2}v_1'$

$= 14(e^{-t} - e^{-6t})\,V, \forall\, t > 0$