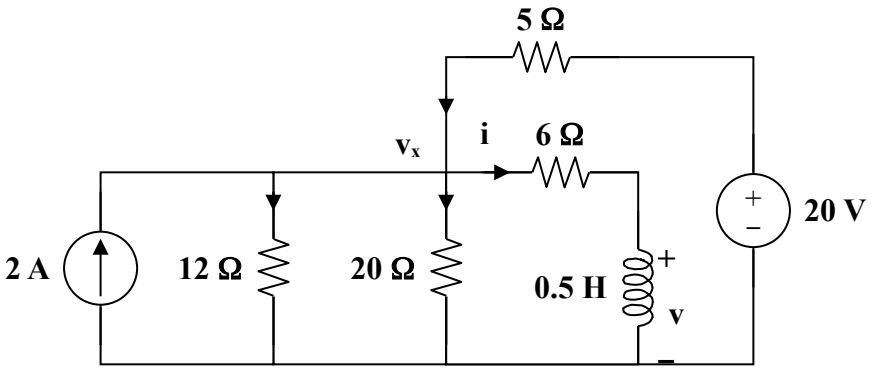
Chapter 7, Solution 56.

$$R_{eq} = 6 + 20 \,||\, 5 = 10\ \Omega,\quad \tau = \frac{L}{R} = 0.05$$

$$i(t) = i(\infty) + \left[\, i(0) - i(\infty) \right] e^{-t/\tau}$$

i(0) is found by applying nodal analysis to the following circuit.



$$2 + \frac{20 - v_x}{5} = \frac{v_x}{12} + \frac{v_x}{20} + \frac{v_x}{6} \longrightarrow v_x = 12$$

$$i(0) = \frac{v_x}{6} = 2\ \text{A}$$

Since $20 \,||\, 5 = 4$,

$$i(\infty) = \frac{4}{4+6}(4) = 1.6$$

$$i(t) = 1.6 + (2 - 1.6)e^{-t/0.05} = 1.6 + 0.4e^{-20t}$$

$$v(t) = L\frac{di}{dt} = \frac{1}{2}(0.4)(-20)e^{-20t}$$

$$v(t) = \mathbf{-4e^{-20t}\ V}$$