14.40 Determine the initial and final values of the voltage $v_o(t)$ in the network in Fig. P14.40.

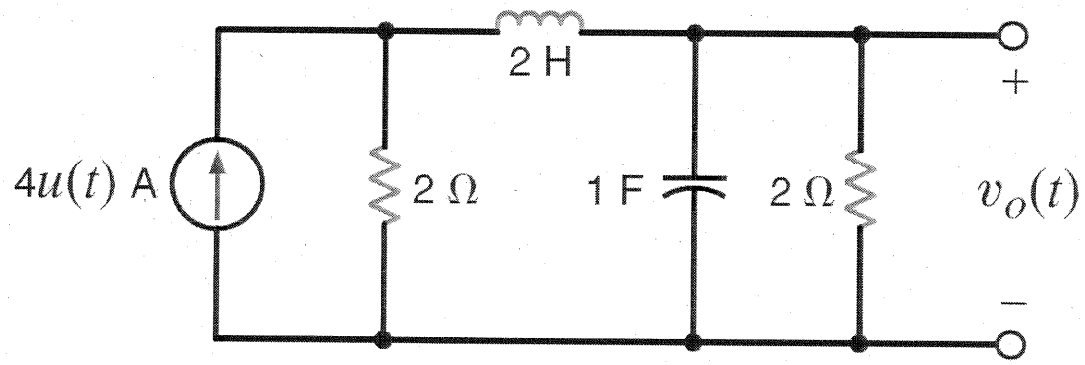
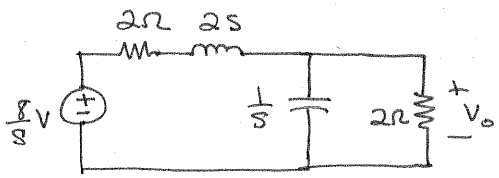


Figure P14.40

SOLUTION: Use source transformation,



Let $Z_1 = 2s + 2\Omega$ and

$Z_2 = 2(1/s) / (2 + 1/s) = \frac{2}{2s+1}\ \Omega$

$$V_o = \frac{8}{s}\left[\frac{Z_2}{Z_1 + Z_2}\right] = \frac{8}{s}\left[\frac{2}{2 + (2s+2)(2s+1)}\right] = \frac{16}{s(4s^2 + 6s + 4)}$$

$$\lim_{t \to 0} v_o(t) = \lim_{s \to \infty} sV_o(s) = \frac{16}{4\infty^2} = 0 \qquad \boxed{v_o(0) \to 0}$$

$$\lim_{t \to \infty} v_o(t) = \lim_{s \to 0} sV_o(s) = \frac{16}{4} = 4 \qquad \boxed{v_o(\infty) \to 4\,V}$$