

Chapter 10, Solution 71.

Find v_o in the op amp circuit shown in Fig. 114.

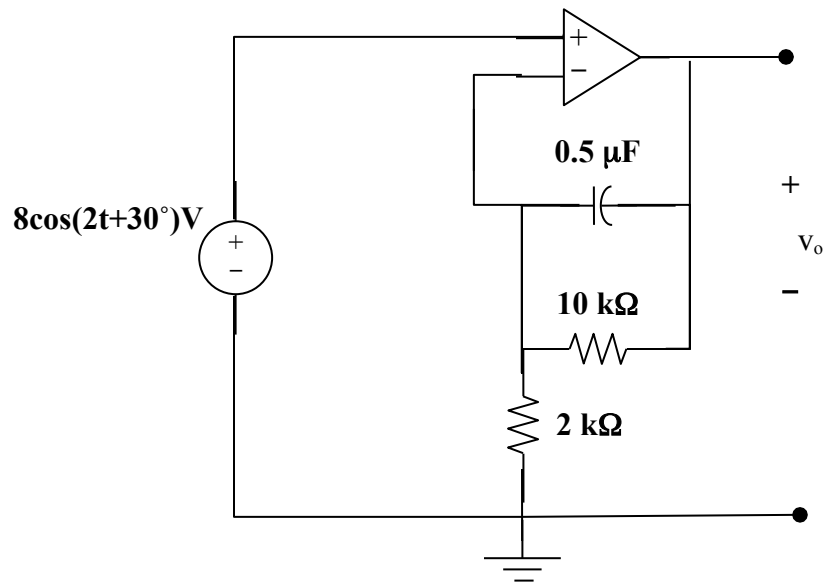


Figure 10.114
For Prob. 10.71.

Solution

$$8 \cos(2t + 30^\circ) \longrightarrow 8 \angle 30^\circ$$

$$0.5 \mu\text{F} \longrightarrow \frac{1}{j\omega C} = \frac{1}{j2 \times 0.5 \times 10^{-6}} = -j1 \text{ M}\Omega$$

At the inverting terminal,

$$\frac{V_o - 8 \angle 30^\circ}{-j1000\text{k}} + \frac{V_o - 8 \angle 30^\circ}{10\text{k}} = \frac{8 \angle 30^\circ}{2\text{k}} \longrightarrow$$

$$V_o(1 - j100) = 8 \angle 30^\circ + 800 \angle -60^\circ + 4000 \angle -60^\circ$$

$$V_o = \frac{6.928 + j4 + 2400 - j4157}{1 - j100} = \frac{4800 \angle -59.9^\circ}{100 \angle -89.43^\circ} = 48 \angle 29.53^\circ$$

$$v_o(t) = 48 \cos(2t + 29.53^\circ) \text{ V}$$