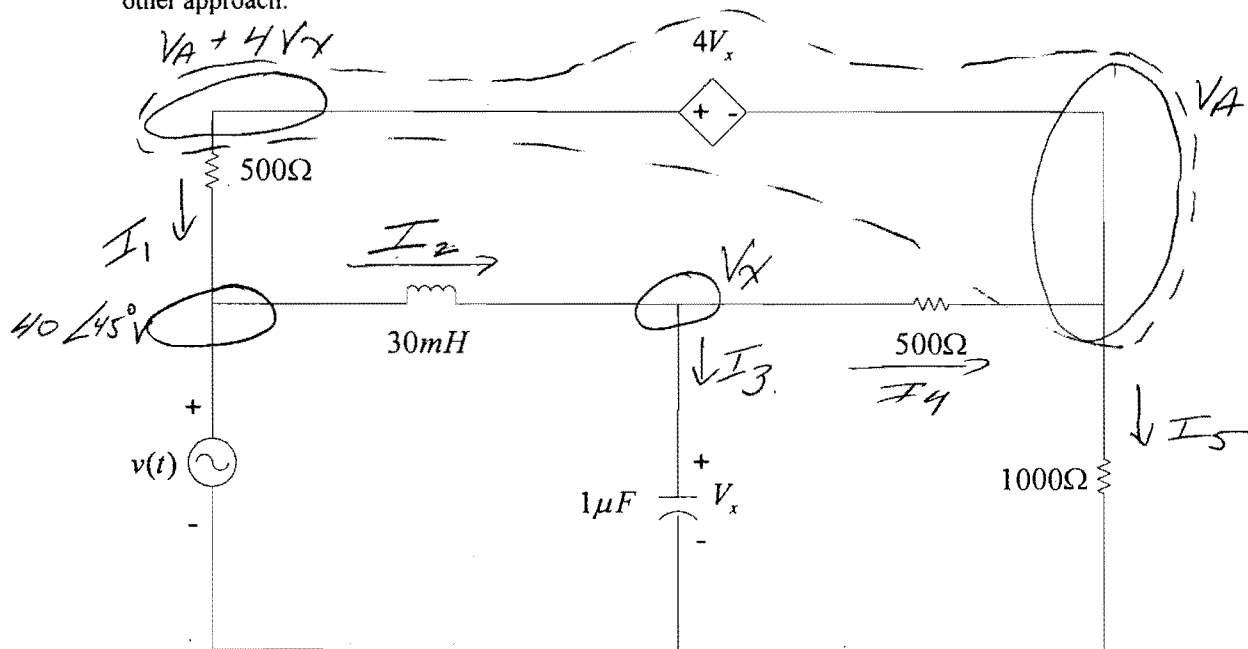


Given $v(t) = 40\cos(1000t + 45^\circ)V$ find $V_x(t)$ using **NODAL ANALYSIS**. No credit will be given for any other approach.



$$V = 40 \angle 45^\circ \text{ V}$$

$$Z_L = j\omega L = j(1000)(30 \times 10^{-3}) = j30 \Omega$$

$$Z_C = -j\left(\frac{1}{\omega C}\right) = -j\left(\frac{1}{(1000)(1 \times 10^{-6})}\right) = -j1000 \Omega$$

Supernode

$$I_1 + I_5 = I_4$$

$$\frac{(V_A + 4V_x) - 40 \angle 45^\circ}{500} + \frac{V_A}{1000} = \frac{V_x - V_A}{500}$$

$$V_A = 33.21 \angle -144.4^\circ \text{ V}$$

$$V_x = 40.90 \angle 38.6^\circ \text{ V}$$

$$V_x(t) = 40.90 \cos(1000t + 38.6^\circ) \text{ V}$$

Node B

$$I_2 = I_3 + I_4$$

$$\frac{40 \angle 45^\circ - V_x}{j30} = \frac{V_x}{-j1000} + \frac{V_x - V_A}{500}$$

No aid given, received, or observed: _____