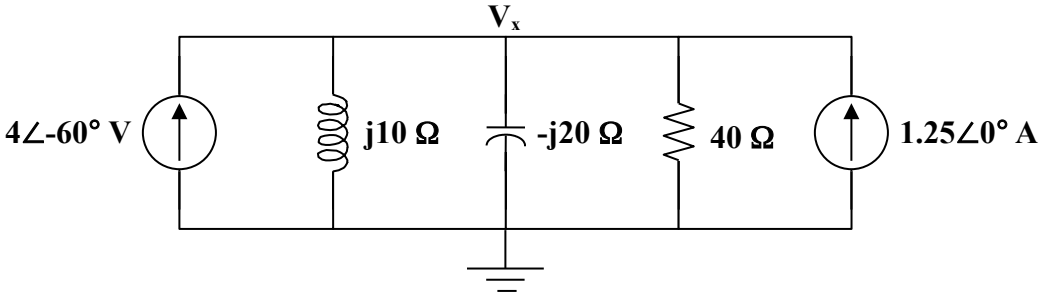
Chapter 10, Solution 51.

There are many ways to create this problem, here is one possible solution. Let $V_1 = 40\angle 30°$ V, $X_L = 10\ \Omega$, $X_C = 20\ \Omega$, $R_1 = R_2 = 80\ \Omega$, and $V_2 = 50$ V.

If we let the voltage across the capacitor be equal to V_x, then
$\mathbf{I_o} = [\mathbf{V_x}/(-j20)] + [(\mathbf{V_x}-50)/80] = (0.0125+j0.05)\mathbf{V_x} - 0.625 = (0.051539\angle 75.96°)\mathbf{V_x} - 0.625$.

The following circuit is obtained by transforming the voltage sources.



$\mathbf{V_x} = (4\angle -60°+1.25)/(-j0.1+j0.05+0.025) = (2-j3.4641+1.25)/(0.025-j0.05)$
$= (3.25-j3.4641)/(0.025-j0.05) = (4.75\angle -46.826°)/(0.055902\angle -63.435°)$
$= 84.97\angle 16.609°$ V.

Therefore,

$\mathbf{I_o} = (0.051539\angle 75.96°)(84.97\angle 16.609°) - 0.625 = 4.3793\angle 92.569° - 0.625$
$= -0.196291+j4.3749 - 0.625 = -0.821291+j4.3749 =$ **$4.451\angle 100.63°$ A**.