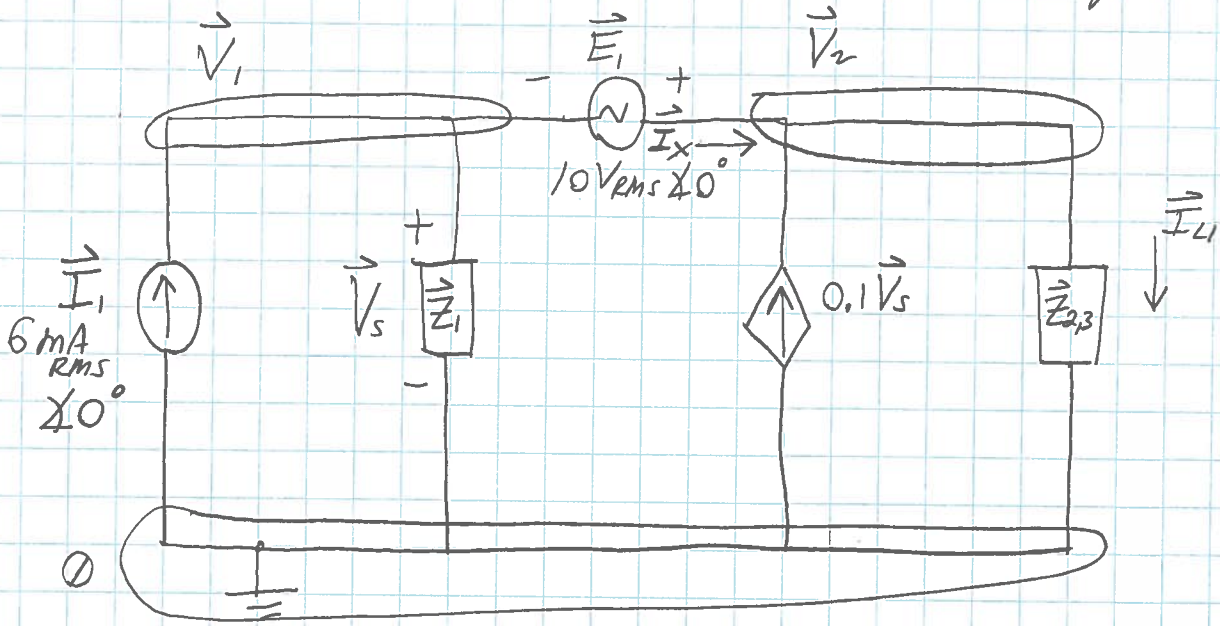

$\vec{Z}_1 = 1000\,\Omega$

$\vec{Z}_{2,3} = (4000 + j6004)\,\Omega$

KCL

$\sum I_{IN} = \sum I_{OUT}$

$$V_1:\quad 6\times10^{-3}\angle 0^\circ = \frac{\vec{V}_1}{\vec{Z}_1} + \vec{I}_x$$

$$\vec{V}_1\left(\frac{1}{1000}\right) + \vec{I}_x = 6\times10^{-3}\angle 0^\circ \qquad (1)$$

$$V_2:\quad 0.1\vec{V}_s + \vec{I}_x = \frac{\vec{V}_2}{\vec{Z}_{2,3}}$$

BUT $\vec{V}_s = \vec{V}_1$

$\therefore$ WE HAVE $\quad 0.1\vec{V}_1 + \vec{I}_x - \dfrac{\vec{V}_2}{(4000+j6004)} = \emptyset \qquad (2)$

REARRANGING:

$$\frac{1}{1000}\vec{V}_1 + 0\vec{V}_2 + \vec{I}_x = 6\times10^{-3}\angle 0^\circ \qquad (1)$$

$$0.1\vec{V}_1 - \frac{\vec{V}_2}{(4000+j6004)} + \vec{I}_x = \emptyset \qquad (2)$$

ALSO KNOW $\vec{E}_1 = \vec{V}_2 - \vec{V}_1$

OR $-\vec{V}_1 + \vec{V}_2 + 0\vec{I}_x = 10\angle 0^\circ \quad (3)$

SOLVE:

$$1\times10^{-3}\,\vec{V}_1 + 0\,\vec{V}_2 + \vec{I}_x = 6\times10^{-3}\angle 0^\circ \quad (1)$$

$$0.1\,\vec{V}_1 - (138.6\times10^{-6}\angle -56.33^\circ)\vec{V}_2 + \vec{I}_x = \varnothing \quad (2)$$

$$-\vec{V}_1 + \vec{V}_2 + 0\,\vec{I}_x = 10\angle 0^\circ \quad (3)$$

$AX = B \quad \therefore \quad X = A^{-1}B$

$$B = \begin{bmatrix} 54.16\times10^{-3}\angle -167.6^\circ \\ 9.947\angle -66.81\times10^{-3\,\circ} \\ 6.053\times10^{-3}\angle 109.8\times10^{-3\,\circ} \end{bmatrix} \begin{matrix} \leftarrow \vec{V}_1 \\ \leftarrow \vec{V}_2 \\ \leftarrow \vec{I}_x \end{matrix}$$

$$\vec{I}_{L1} = \frac{\vec{V}_2}{\vec{Z}_{2,3}} = \frac{9.947\,V_{rms}\angle -66.81\times10^{-3\,\circ}}{(4000 + j6004)\,\Omega}$$

$$\boxed{\vec{I}_{L1} = 1.38\,mA_{RMS}\angle -56.4^\circ}$$

CHECK: $\vec{E}_1 \overset{?}{=} \vec{V}_2 - \vec{V}_1$

$$10V_{rms}\angle 0^\circ \overset{?}{=} (9.947V_{rms}\angle -66.81\times10^{-3\,\circ}) - (54.16mV_{RMS}\angle -167.6^\circ)$$

$$10V_{rms}\angle 0^\circ \overset{?}{=} 9.99\,V_{rms}\angle 179\times10^{-6\,\circ}$$

<u>YES</u>