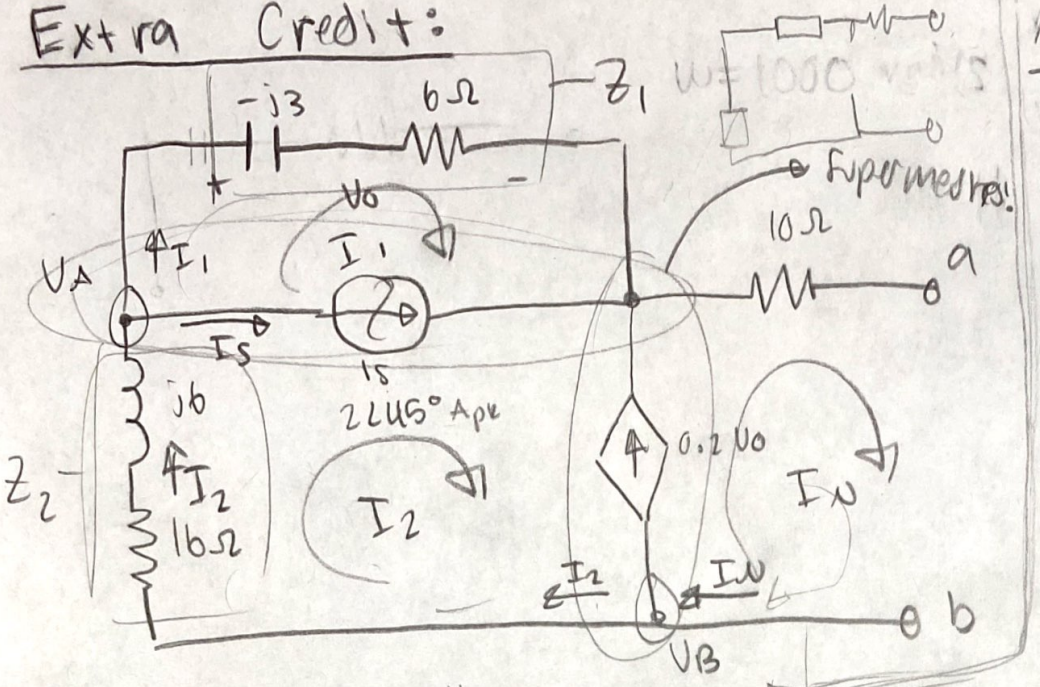
Extra Credit:



Note: LT

$\omega = 1000$ rad/s

$V_0 = Z_1 \cdot I_1$

$= (6 - j3)(2.96\angle -178.3)$

$V_0 = (19.858\angle 155.12)\ V$

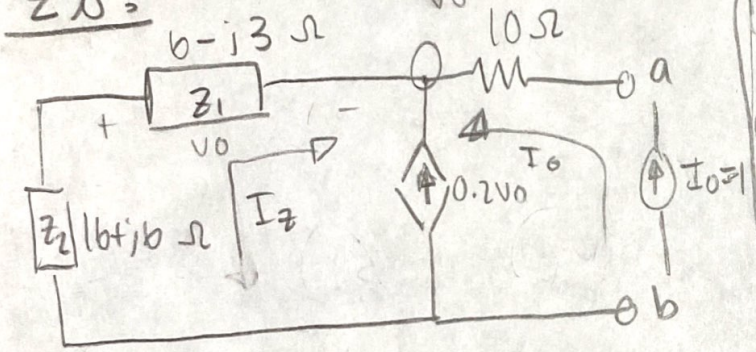
LT Spice

around super-supermesh

$Z_1 I_1 + Z_2 I_2 + 2 I_\nu = 0$

$(6 - j3) I_1 + (16 + j6) I_2 + 10 I_\nu = 0$ — eqn①

Z_ν:



@ V_0:

$I_0 + 0.2 V_0 = I_2$

$1 + 0.2 V_0 = \frac{V_0}{22 + j3}$

$1 = (-0.156 - j0.006) V_0$

$V_0 = -6.42617 + j0.251678$

$Z_\nu = \frac{V_0}{I_0}$

$\boxed{Z_\nu = -6.43 + j0.25\ \Omega}$

@ V_A:

$I_2 = I_1 + I_S$

$I_1 - I_2 = 2\angle -135$ — eqn②

@ V_B:

$I_\nu = I_2 + 0.2 V_0$ ($\rightarrow Z_1 \cdot I_1$)

$(1 - 0.6j) I_1 + I_2 - I_\nu = 0$ — eqn③

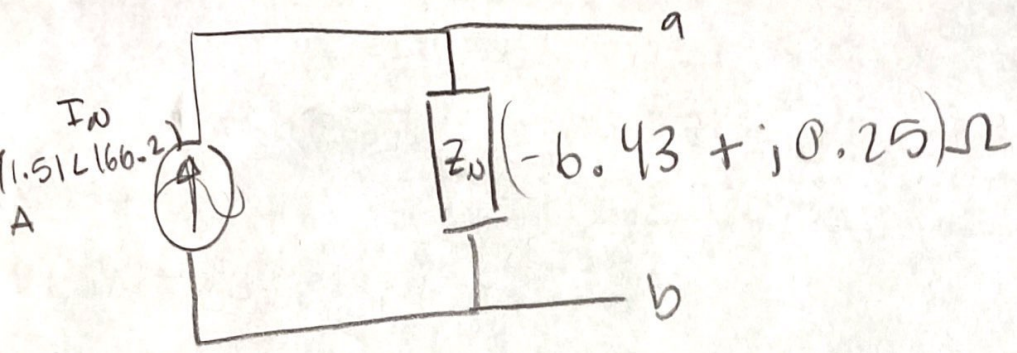
$$\begin{bmatrix} 6-j3 & 16+j6 & 10 \\ -1 & 1 & 0 \\ 1-j0.6 & 1 & -1 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_\nu \end{bmatrix} = \begin{bmatrix} 0 \\ 2\angle -135 \\ 0 \end{bmatrix}$$

$I_1 = (2.96\angle -178.3°)\ A$

$I_2 = (2.04\angle -40.7°)\ A$

$\boxed{I_\nu = (1.51\angle 166.2°)\ A}$

Scanned with CamScanner



$$X_C = -j3 = \frac{1}{j(1000)C}$$

$$C = \frac{1}{30000} = 333.$$

$$X_L = jb = j(1000)L$$

$$L = 0.006 = 6\ mH$$

Scanned with CamScanner