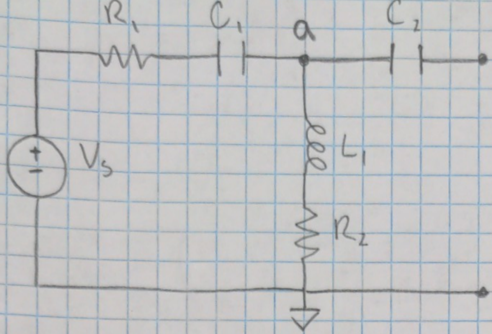


$R_1 = 985.6\ \Omega$

$R_2 = 981.2\ \Omega$

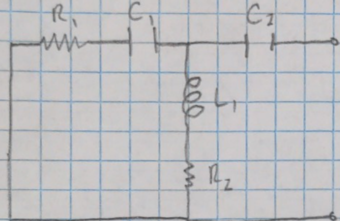
$C_1 = 47.68\ nF = -j1049\ \Omega$

$C_2 = 58.02\ nF = -j861.8\ \Omega$

$L_1 = 10.44\ mH = j208.8\ \Omega$

$V_s = 8\cos(20{,}000t) = 8\angle 0°\ V$ $\quad \omega = 20000\ rad/s$

Z_{Th})



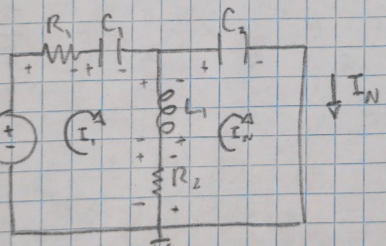
$Z_{Th} = (R_1 + C_1) \| (R_2 + L_1) + C_2$

$$\boxed{Z_{Th} = 661.3 - j998\ \Omega}$$

V_{Th}) $V_{Th} = V_a$ Use a voltage divider to find voltage at V_a

$$V_a = V_s\left(\frac{R_2 + L_1}{R_1 + R_2 + C_1 + L_1}\right) \Rightarrow \boxed{V_a = V_{Th} = 3.07 + j2.16 = 3.75\angle 35.14°}$$

I_N)



I_1) $(-V_s + (R_1 + C_1)I_1 + (R_2 + L_1)(I_1 - I_N) = 0)$
$+V_s$

$(R_1 + C_1)I_1 + (R_2 + L_1)I_1 + (-R_2 - L_1)I_N = V_s$

$(1966.8 - j840.2)I_1 + (-981.2 - j208.8)I_N = V_s$

I_N) $(R_2 + L_1)(I_N - I_1) + C_2 I_N = 0$

$(R_2 + L_1 + C_2)I_N + (-R_2 - L_1)I_1 = 0$

$(981.2 - j653)I_N + (-981.2 - j208.8)I_1$

$$\begin{bmatrix} 1966.8 - j840.2 & -981.2 - j208.8 \\ -981.2 - j208.8 & 981.2 - j653 \end{bmatrix} \begin{bmatrix} I_1 \\ I_N \end{bmatrix} = \begin{bmatrix} V_s \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} I_1 \\ I_N \end{bmatrix} = \begin{bmatrix} 2.56 + j2.64 \\ -.087 + j3.13 \end{bmatrix} mA$$

$$\boxed{I_N = -.08 + j3.13 = 3.13\angle 88.5°\ mA}$$