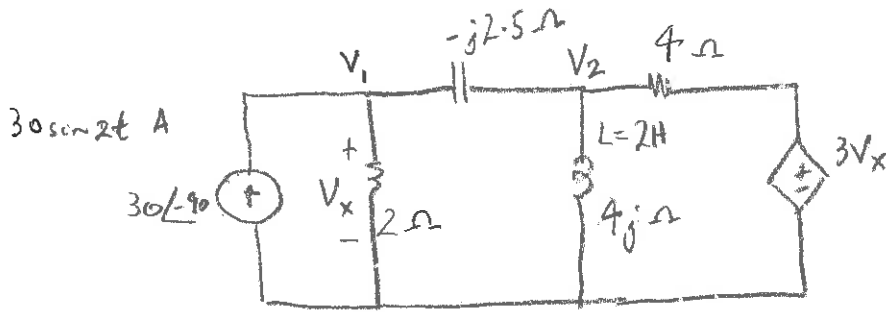


NODAL ANALYSIS PROBLEM  
 $C = 0.2F$



$\omega = 2$   
 $30 \sin 2t = 30 \cos(2t - 90^\circ) \rightarrow 30 \angle -90$   
 $0.2F \rightarrow \frac{1}{j\omega C} = \frac{1}{j(2)(0.2)} = -j2.5 \Omega$   
 $2H \rightarrow j\omega L = j(2)(2) = 4j$

KCL Node 1:  $-30 \angle -90 + \frac{V_1}{2} + \frac{(V_1 - V_2)}{-j2.5} = 0 \Rightarrow V_1 \left( \frac{1}{2} - \frac{1}{j2.5} \right) + V_2 \left( \frac{1}{j2.5} \right) = \underbrace{30 \angle -90}_{-30j}$

KCL Node 2:  $\frac{V_2 - V_1}{-j2.5} + \frac{V_2}{4j} + \frac{V_2 - 3V_x}{4} = 0$   
 $V_x = V_1$   
 $\Rightarrow V_1 \left( \frac{1}{j2.5} - \frac{3}{4} \right) + V_2 \left( \frac{1}{-j2.5} + \frac{1}{4j} + \frac{1}{4} \right) = 0$

$\Rightarrow V_1 (0.5 + 0.4j) - V_2 (0.4j) = -30j \Rightarrow V_1 = \frac{\begin{vmatrix} -30j & -0.4j \\ 0 & 0.25 + 0.15j \end{vmatrix}}{\begin{vmatrix} 0.5 + 0.4j & -0.4j \\ -0.75 - 0.4j & 0.25 + 0.15j \end{vmatrix}} = \frac{4.5 - 7.5j}{0.225 - 0.125j}$

$\therefore V_1 = 29.439 - 16.98j = 33.98 \angle -29.98^\circ$

$V_2 = \frac{\begin{vmatrix} 0.5 + 0.4j & -30j \\ -0.75 - 0.4j & 0 \end{vmatrix}}{\begin{vmatrix} 0.5 + 0.4j & -0.4j \\ -0.75 - 0.4j & 0.25 + 0.15j \end{vmatrix}} = \frac{12 - 22.5j}{0.225 - 0.125j} = 83.20 - 53.7j = 99 \angle -32.8^\circ$

$\Rightarrow \begin{cases} v_1 = 33.98 \cos(2t - 29.98^\circ) \\ v_2 = 99 \cos(2t - 32.8^\circ) \end{cases}$