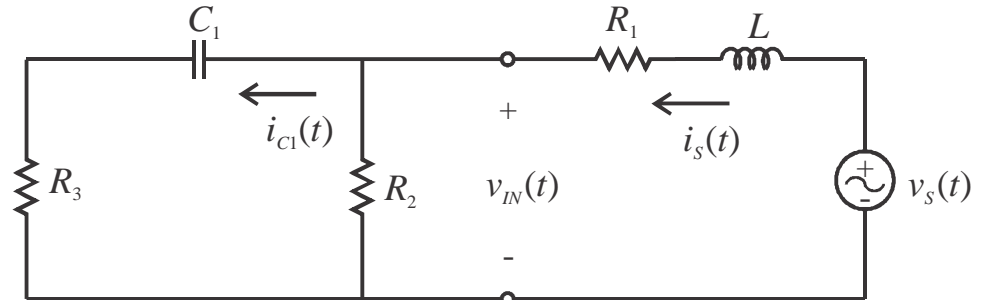


EE 220 Circuits I (Spring 2011) Examination 4

Name _____

Instructions: Show all work for full credit. Write answers in indicated places. Attach equation sheet to exam.
Put impedance in rectangular format and all phasor voltages/currents in polar format (angle in degrees).

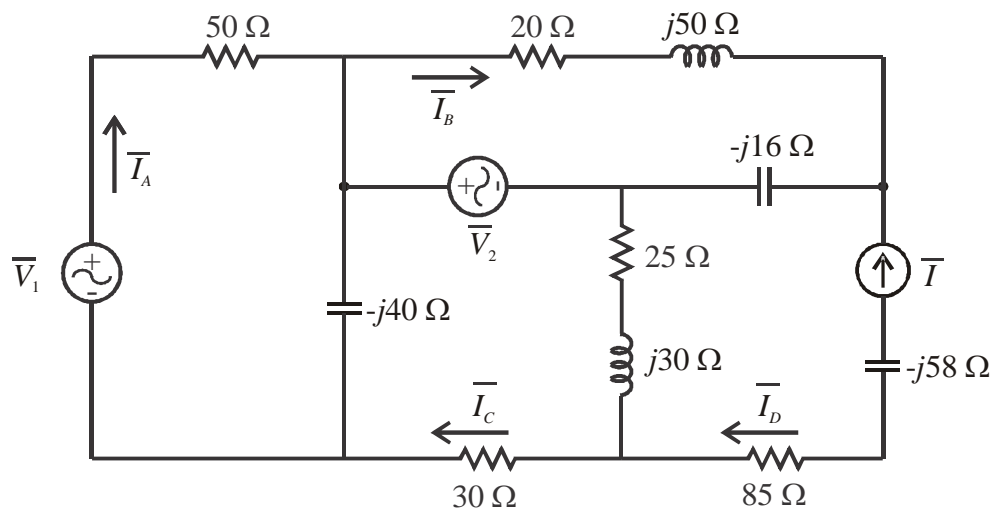
- 1) For the circuit, $v_s(t) = 28\cos(2500t + 60^\circ)$ V, $R_1 = 40\ \Omega$, $R_2 = 80\ \Omega$, $R_3 = 90\ \Omega$, $C_1 = 12\ \mu\text{F}$, and $L = 20\ \text{mH}$. Sketch a fully-labeled phasor equivalent circuit. Then, determine the equivalent impedance \bar{Z}_{eq} seen by the voltage source. Next, determine the time-domain currents $i_s(t)$ and $i_{C_1}(t)$ as well as the time-domain voltage $v_{IN}(t)$.



$$\bar{Z}_{eq} = \underline{83.75 + j42.89\ \Omega} \qquad v_{IN}(t) = \underline{13.189 \cos(2500t + 23.65^\circ)\ \text{V}}$$

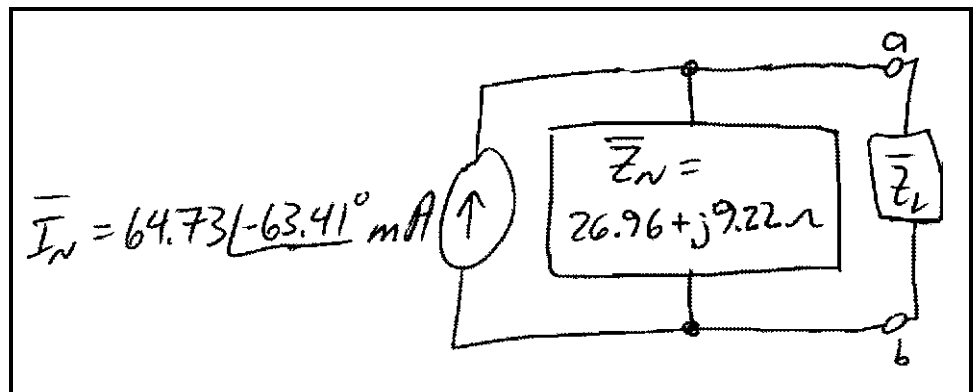
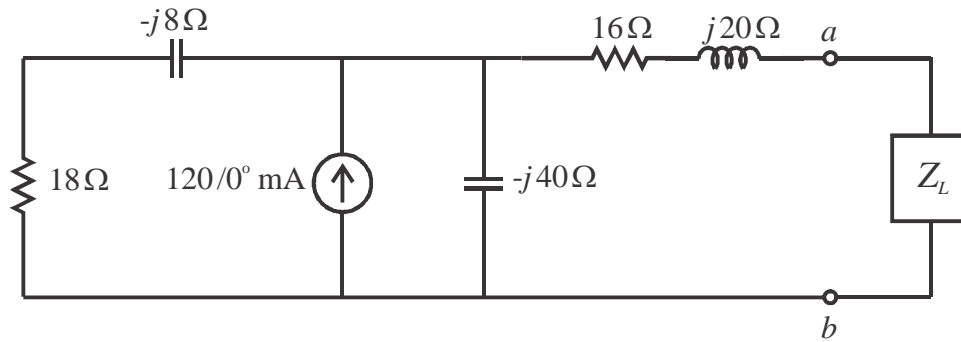
$$i_s(t) = \underline{0.2976 \cos(2500t + 32.88^\circ)\ \text{A}} \qquad i_{C_1}(t) = \underline{0.1374 \cos(2500t + 43.97^\circ)\ \text{A}}$$

- 2) For the circuit shown, find the phasor currents \bar{I}_A , \bar{I}_B , \bar{I}_C , and \bar{I}_D by **mesh analysis** when $\bar{I} = 0.3\angle -45^\circ$ A, $\bar{V}_1 = 30\angle 0^\circ$ V, and $\bar{V}_2 = 24\angle 30^\circ$ V.

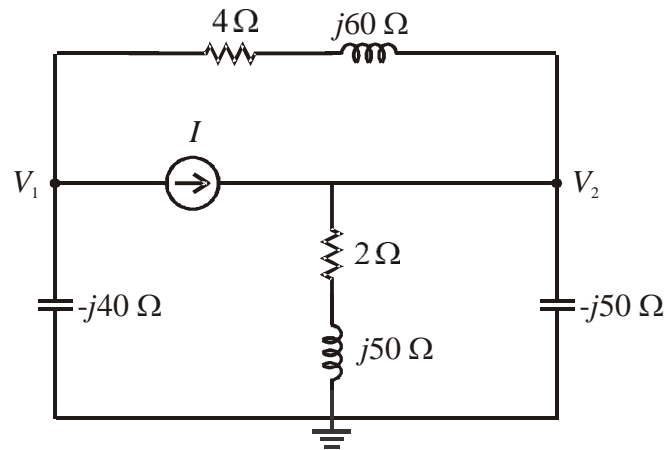


$\bar{I}_A = \underline{0.3147\angle 75.87^\circ}$ A $\bar{I}_B = \underline{0.7266\angle -27.05^\circ}$ A $\bar{I}_C = \underline{0.463\angle -131.1^\circ}$ A $\bar{I}_D = \underline{0.3\angle 135^\circ}$ A

3) For the circuit shown, find and sketch (in box) the Norton equivalent circuit seen by Z_L .



- 4) For the circuit shown, find the phasor voltages \bar{V}_1 and \bar{V}_2 by **nodal analysis**. Given:
 $\bar{I} = 0.3 \angle -45^\circ \text{ A}$.



$$\bar{V}_1 = \underline{0.5753 \angle 132.556^\circ \text{ V}} \quad \bar{V}_2 = \underline{17.992 \angle 40.266^\circ \text{ V}}$$