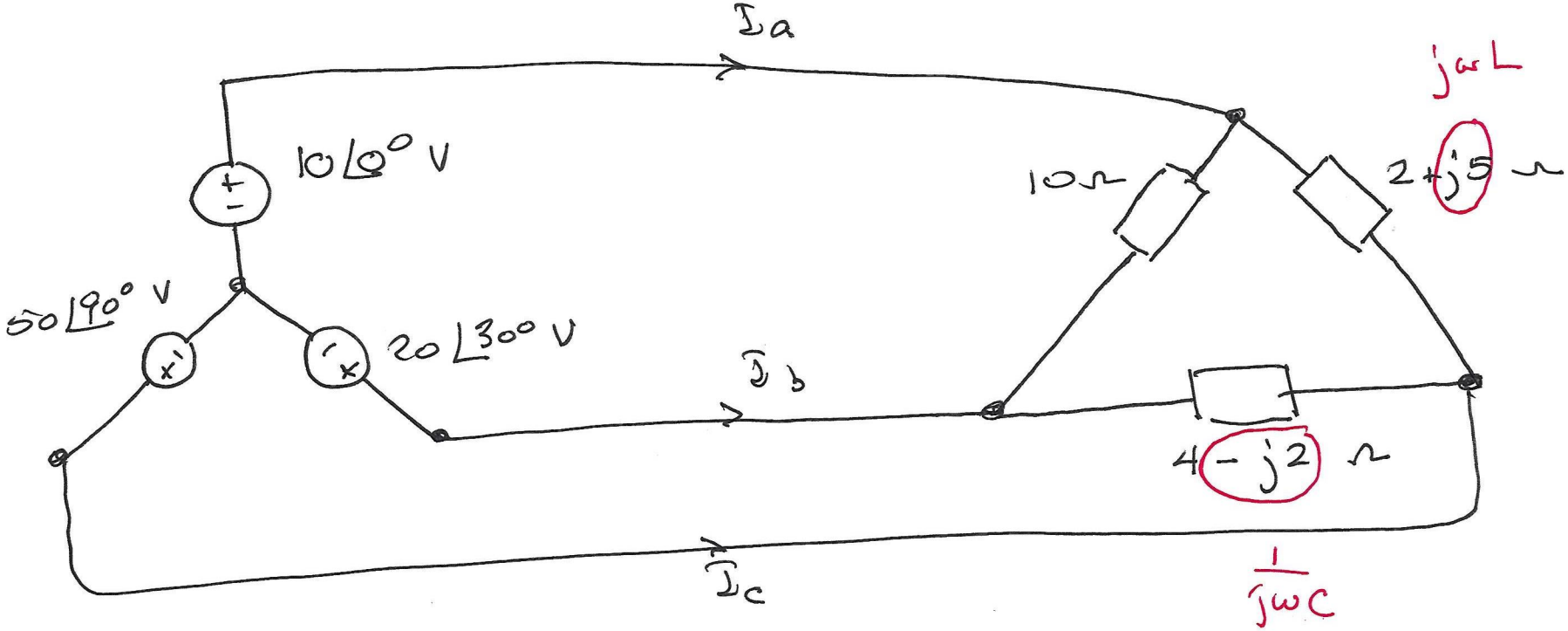
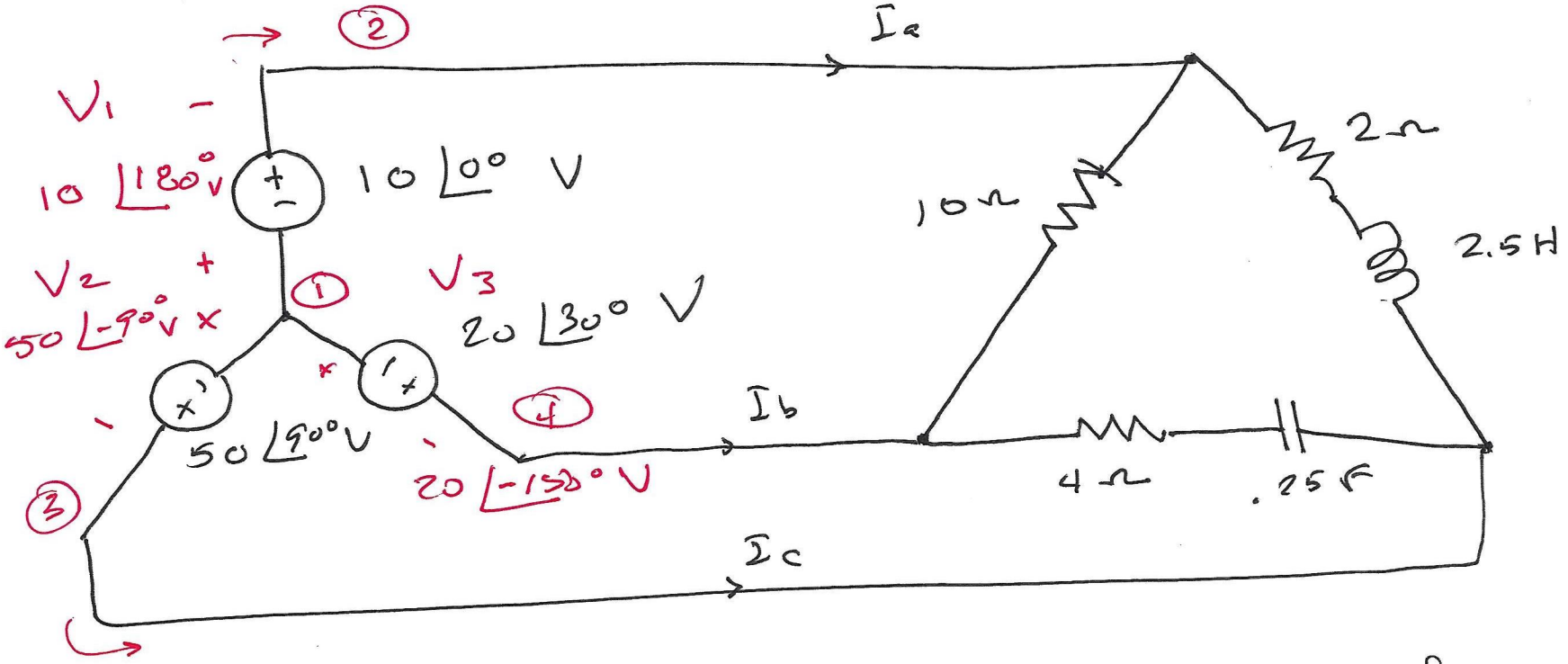


Choose, for example, $\omega = 2$ rad/s

Then $j2L = j5 \Rightarrow L = 2.5$ H

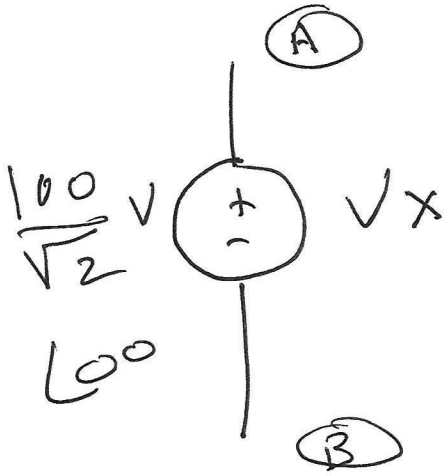
$-j\frac{1}{2C} = -j2 \Rightarrow C = \frac{1}{4}$ F



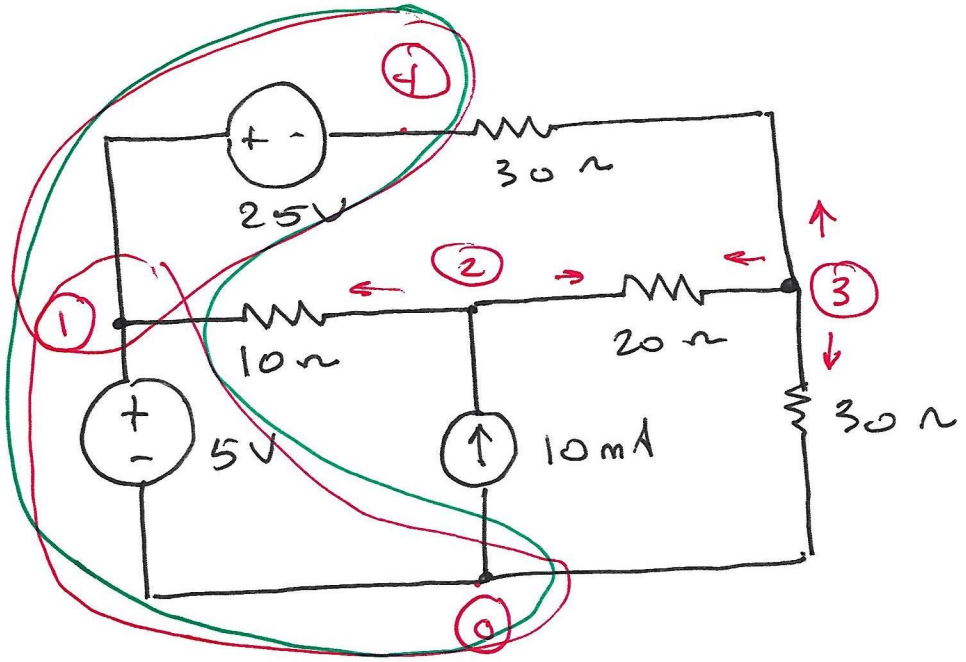
$\omega = 2$ rad/s

$f = \frac{\omega}{2\pi} = \frac{1}{\pi}$ Hz

```
V1   1   2   AC   10   180
V2   1   3   AC   50   -90
V3   1   4   AC   20   -150
:
.AC  LIN  1  {1/pi}  {1/pi}
```



V_x A B AC {100/sqrt(2)} 0



Standard Nodal Analysis

Define supernodes:

$V_1 = 5$

$-V_4 + V_1 = 25$

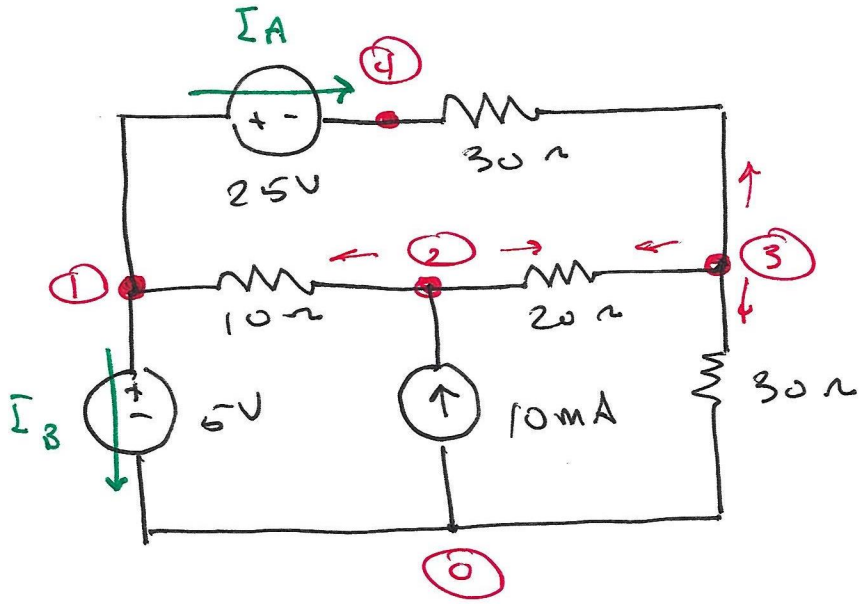
Write 2 KCL eqns.

node 2 $\quad \frac{V_2 - V_1}{10} + \frac{V_2 - V_3}{20} - 10\times10^{-3} = 0$

node 3 $\quad \frac{V_3 - V_2}{20} + \frac{V_3}{30} + \frac{V_3 - V_4}{30} = 0$

Total of 4 eqns.
4 unknowns.

MNA (Modified Nodal Analysis)



Write constraint equations:

$$V_1 - V_4 = 25$$

$$V_1 = 5$$

Total of 6 eqns. & 6 unknowns.

KCL for node 1: $I_A + \frac{V_1 - V_2}{10} + I_B = 0$

KCL for node 2: $\frac{V_2 - V_1}{10} + \frac{V_2 - V_3}{20} - 10\,\text{KLU}^{-3} = 0$

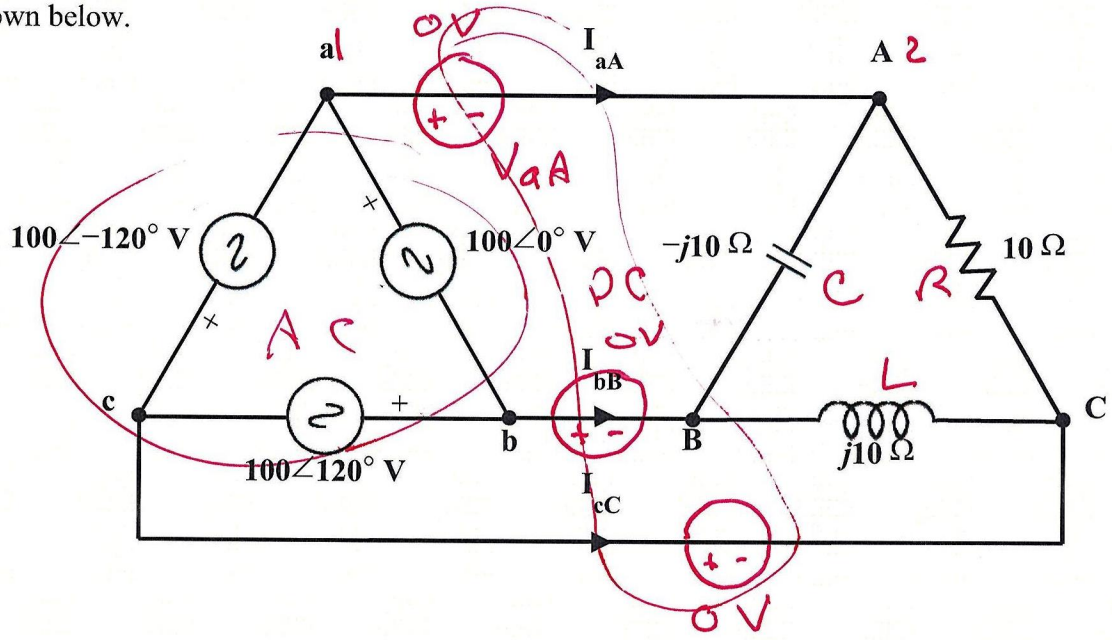
KCL for node 3: $\frac{V_3 - V_2}{20} + \frac{V_3 - V_4}{30} + \frac{V_3}{30} = 0$

KCL for node 4: $-I_A + \frac{V_4 - V_3}{30} = 0$

EE 3340

Homework Problem #043

Find the line currents, $\mathbf{I}_{aA}$, $\mathbf{I}_{bB}$ and $\mathbf{I}_{cC}$ (in polar form) in the unbalanced three-phase circuit shown below.



VaA a1 A2 DC 0

For practice, assume $\omega = 10$ rad/s

$R = 10\ \Omega$

$L = 1$ H ← $j\omega L = j10$, $j10L = j10$, $L = 1$ H

$C = 10$ m ← $-j\frac{1}{\omega C} = -j10$, $\frac{1}{10C} = 10$, $C = .01$ F