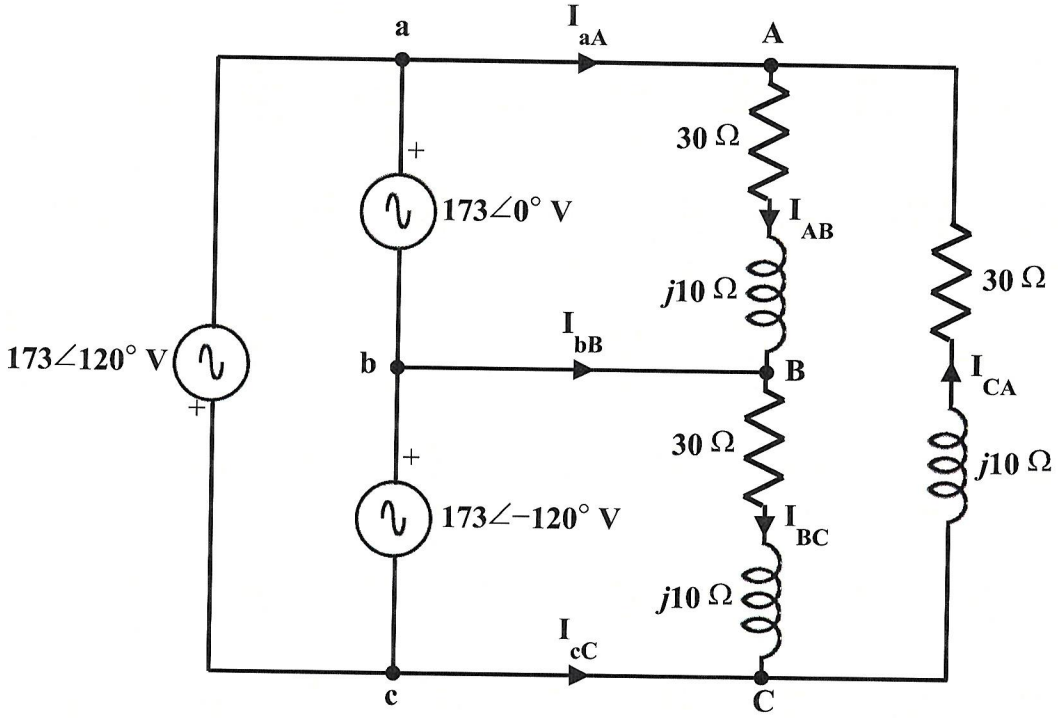
EE 3340

Homework Problem #040

For the circuit shown below, calculate the phase currents (I_{AB}, I_{BC} and I_{CA}) and the line currents (I_{aA}, I_{bB} and I_{cC}) in polar form with angles in degrees.



Let $Z_\Delta = 30 + j10 \approx 31.62 \angle 18.43°\ \Omega$

The phase currents are:

$$I_{AB} = \frac{V_{ab}}{Z_\Delta} = \frac{173\angle 0°}{31.62\angle 18.43°} \approx 5.47\angle -18.43°\ A$$

$$I_{BC} = \frac{V_{bc}}{Z_\Delta} \approx 5.47\angle -138.43°\ A$$

$$I_{CA} = \frac{V_{ca}}{Z_\Delta} \approx 5.47\angle 101.57°\ A$$

The line currents are:

$$I_{aA} = I_{AB} - I_{CA} \approx 9.48\angle -48.43°\ A$$

$$I_{bB} = I_{BC} - I_{AB} \approx 9.48\angle -168.43°\ A$$

$$I_{cC} = I_{CA} - I_{BC} \approx 9.48\angle 71.57°\ A$$