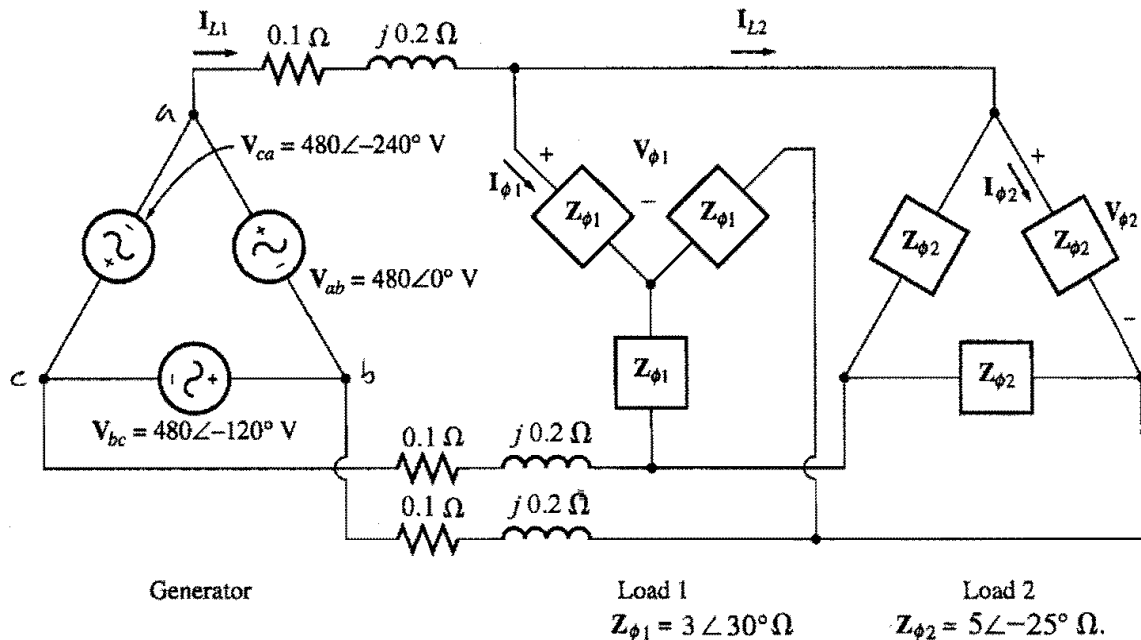


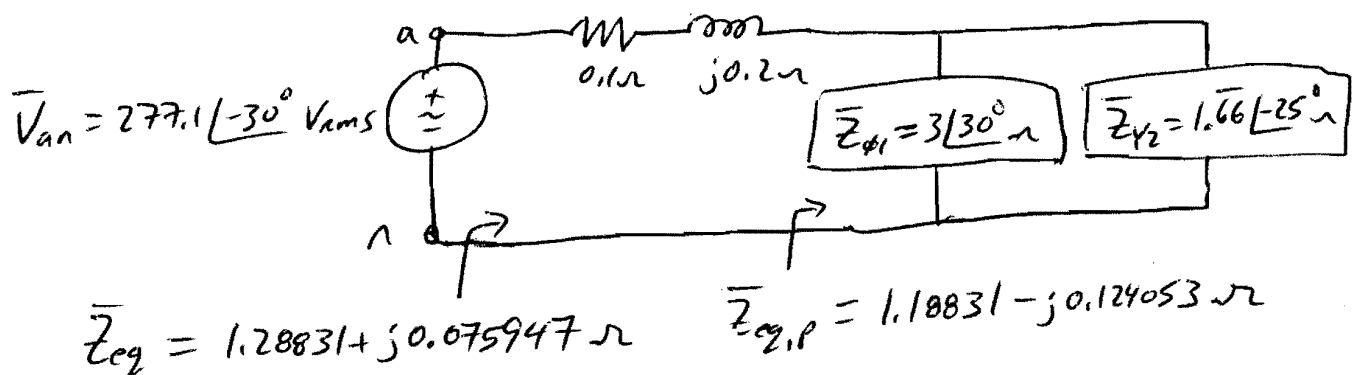
For the modified power system of problem 2-2, draw the equivalent a) Y-Y and b) Δ - Δ power systems. I.e., combine all the impedances into a single equivalent impedance $\bar{Z}_Y$ or $\bar{Z}_\Delta$.

Figure P2-1 | The system in Problem 2-2.



From prior problem, per-phase equivalent circuit-

Since all loads, lines, + sources are balanced, we can analyze the 3 ϕ circuit using a per-phase equivalent circuit based on phase a.

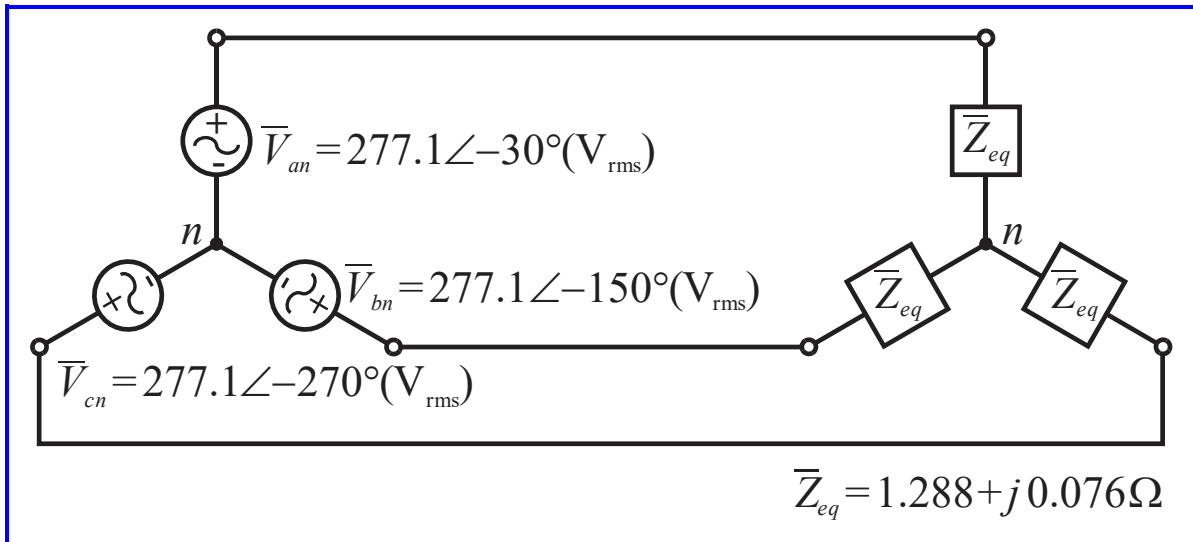


a) Y-Y configuration

$$\bar{V}_{an} = 277.1 \angle -30^\circ \text{ V}_{\text{rms}}$$

Get the other two phase voltages by successively subtracting 120° , i.e.,

$$\bar{V}_{bn} = 277.1 \angle -150^\circ \text{ V}_{\text{rms}} \text{ and } \bar{V}_{cn} = 277.1 \angle -270^\circ \text{ V}_{\text{rms}}.$$



b) Δ - Δ configuration

Use original Δ -source. Find the equivalent Δ -impedances using

$$\bar{Z}_{\Delta} = 3\bar{Z}_Y = 3(1.28831 + j0.075947) = 3.86493 + j0.22784 \Omega.$$

