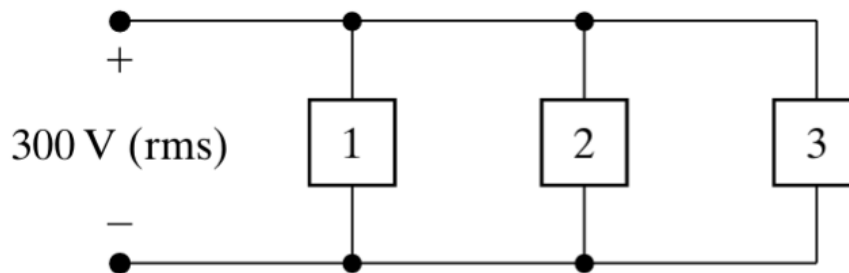**Due time: 23:59, Dec. 10th, 2025**

In order to get full marks, you shall write all the intermediate steps of calculation or proof unless otherwise indicated. This assignment covers content from chapter 11 to 12.

Exercise 5.1 (25%)

Three loads are connected in parallel across a 300 V(rms) line, as shown in the figure below. Load 1 absorbs 3 kW at unity power factor; Load 2 absorbs 5 kVA at 0.8 leading; Load 3 absorbs 5 kW and delivers 6 kvars.
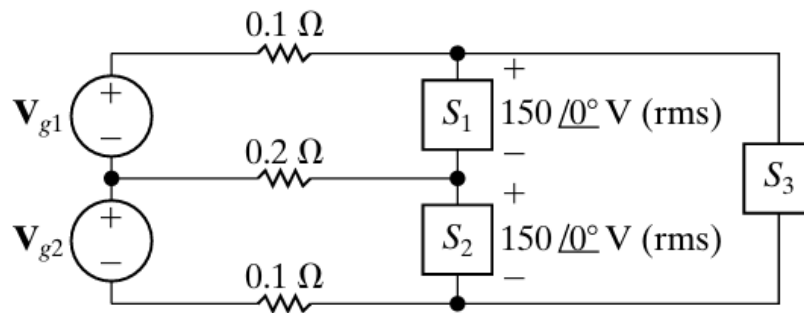
a) Find the impedance that is equivalent to the three parallel loads.

b) Find the power factor of the equivalent load as seen from the line's input terminals.
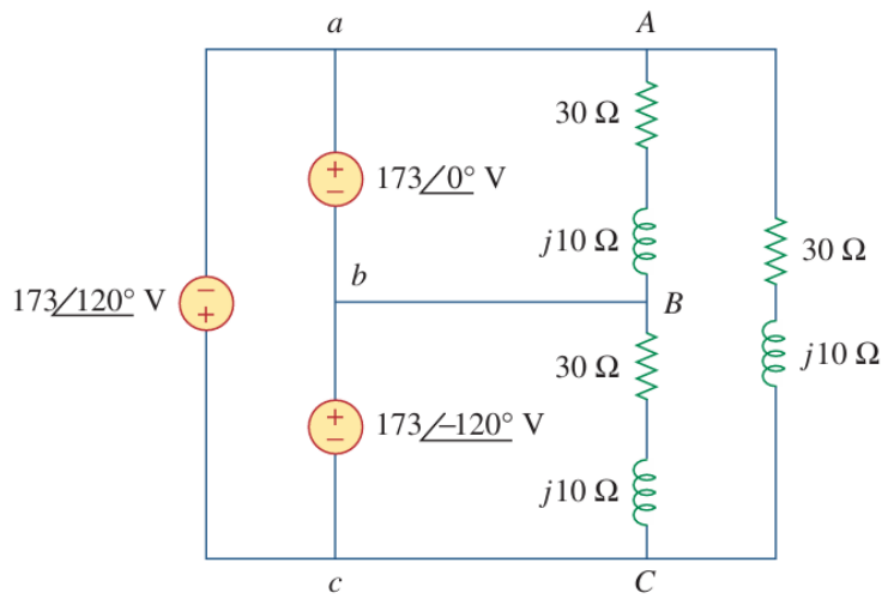
Exercise 5.2 (25%)

The three loads in the circuit seen in the figure below are $S_1 = (6 + j3)kVA$, $S_2 = (7.5 - j4.5)kVA$, $S\_3 = (12 + j9)\ kVA$.

a) Calculate the complex power associated with each voltage source, V_{g1} and V_{g2}.

b) Verify that the total real and reactive power delivered by the sources equals the total real and reactive power absorbed by the network.

Exercise 5.3 (25%)

For the circuit below, calculate the phase and line currents.

Exercise 5.4 (25%)

Find the line currents in the three-phase network. Take $Z_\Delta = 12 - j15\,\Omega$, $Z_Y = 4 + j6\,\Omega$, $Z_L = 2\,\Omega$.