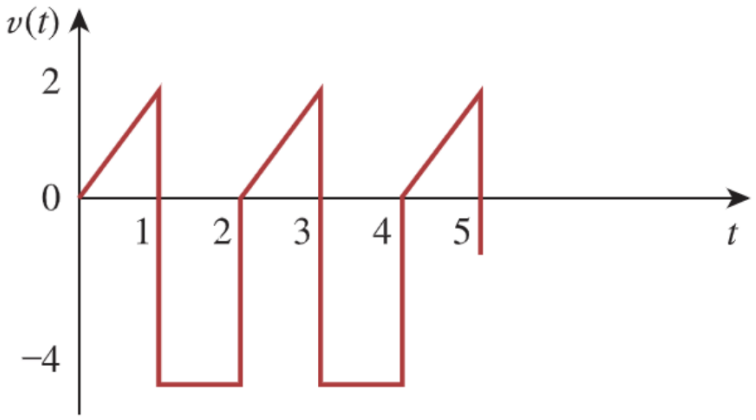
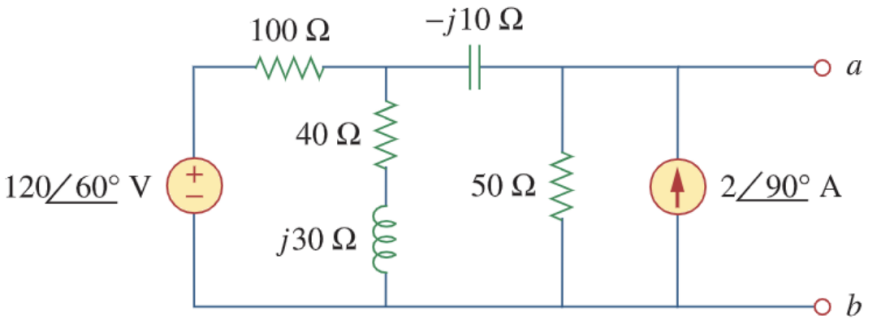
VE215 2025SU Assignment 6

Due Date: 23:59, July.22th, 2025
In order to get full marks, you shall write all the intermediate steps of calculation or proof, unless otherwise indicated.

Exercise 6.1 (10%) Find the rms value of the signal.



Exercise 6.2 (20%) Assuming that the load impedance is to be purely resistive, what load should be connected to terminals a–b of the circuit so that the maximum power is transferred to the load?



Exercise 6.3 (30%)
A 240-V rms 60-Hz source supplies a parallel combination of a 5-kW heater and a 30-kVA induction motor whose power factor is 0.82. Determine:

1. the system apparent power
2. the system reactive power
3. Sketch the power triangle for the current system and label $|S|$, P, and Q
4. the power factor of the current system
5. the kVA rating of a capacitor required to adjust the system power factor to 0.9 lagging
6. the value of the capacitor required

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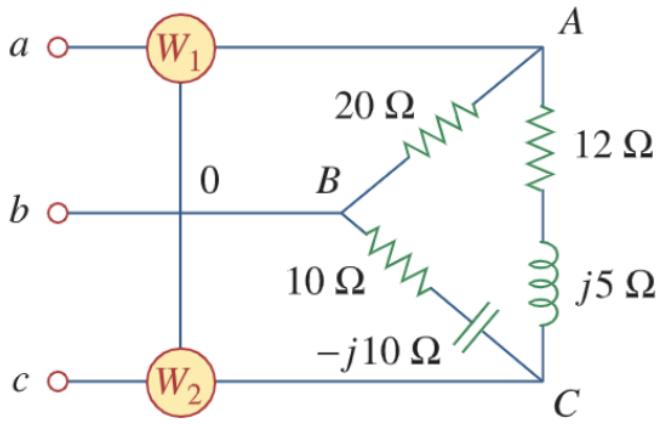
Exercise 6.4 (20%)
Two wattmeters are properly connected to the unbalanced load supplied by a balanced source such that $V_{ab} = 208\angle 0°$ V with positive phase sequence.

1. Determine the reading of each wattmeter.
2. Calculate the total apparent power absorbed by the load.



Exercise 3.5 (20%) For the three-phase circuit below, find the average power absorbed by the delta-connected load with

$$Z_\Delta = 21 + j24\,\Omega.$$