ECE 320
Homework
Due: Lesson 3 (Recite Lesson 2)

1. In the circuit shown in Figure 1, a load having an impedance of 39+j26 Ohms is fed from a voltage
    source through a line having an impedance of 1+j4 Ohms. The voltage source Vs is 250V rms at 60
    Hz.
    a. Calculate the load current and the load voltage.
    b. Calculate the real power and the reactive power delivered to the load.
    c. Calculate the real power losses in the line.
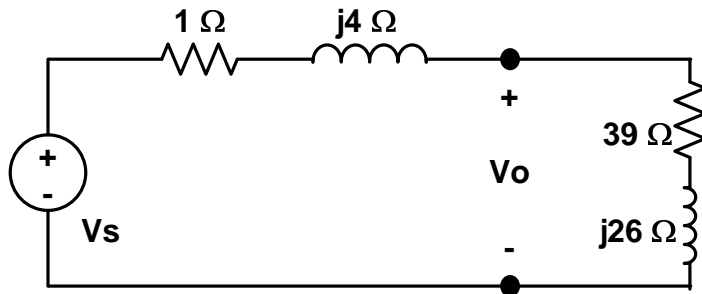   d. Calculate the real power and the reactive power supplied by the source.

Figure 1. Electric power circuit.

2. For the same circuit shown in Figure 1, the source is a step voltage of 12.0u(t) where u(t) is a unit
    step function. The inductors are labeled with their 60Hz impedance. Find the current as a function
    of time.

3. Two loads in the circuit shown in Figure 2 can be described as follows:
    Load 1 absorbs an average of 8kW at a leading power factor of 0.80.
    Load 2 absorbs 20kVA at a lagging power factor of 0.60.
    a. Determine the power factor of the combined two loads in parallel.
    b. Determine the source current.
    c. If the frequency is 60Hz, find the value of the capacitor which, if placed in parallel with the
        two loads, would correct the power factor to 1.00. Let the load voltage be adjusted to 250V
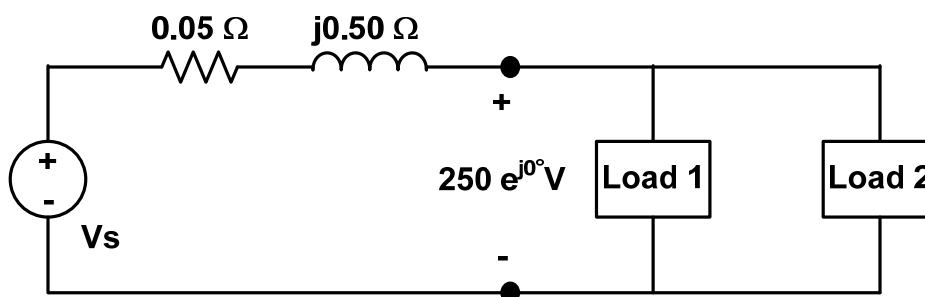   at a zero phase angle.

Figure 2. Two-load distribution circuit

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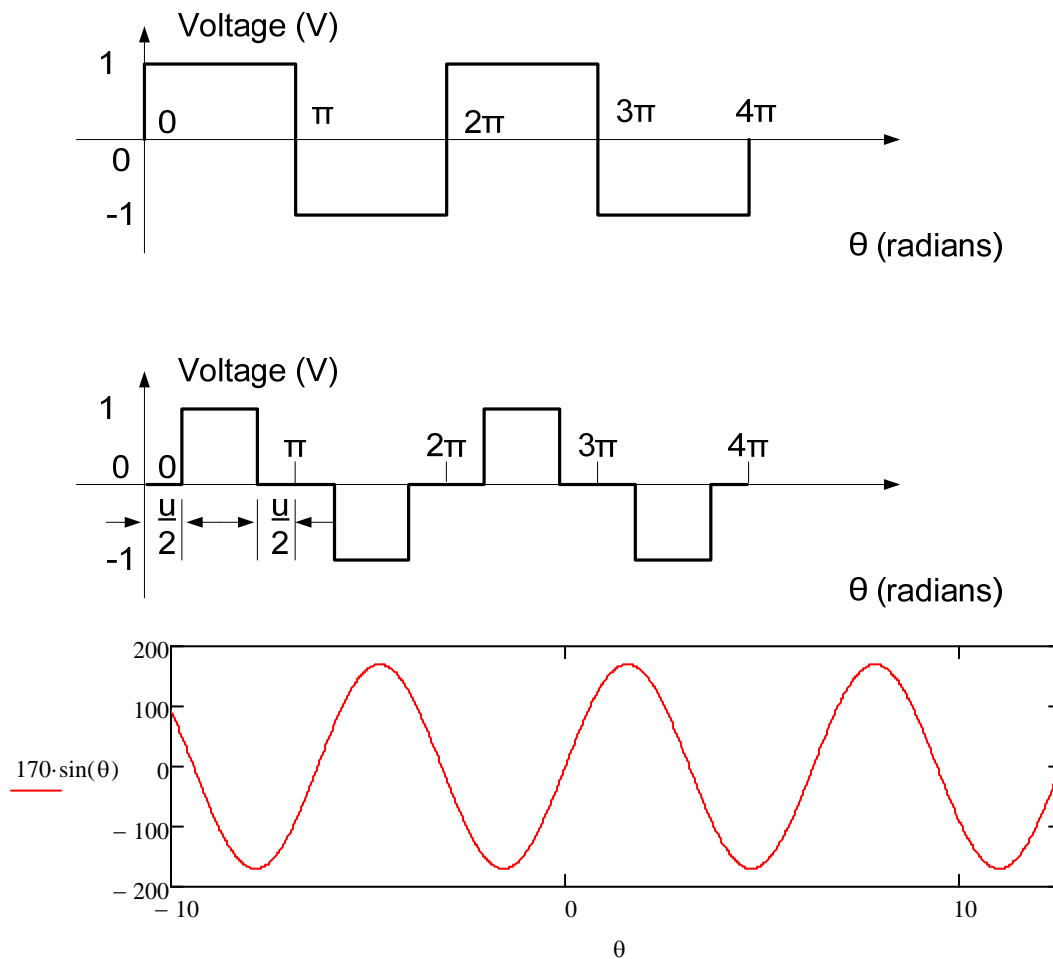4. Calculate the rms values of the voltages with the waveforms shown in Figure 3.

Voltage (V)

Voltage (V)

Figure 3. Waveforms.

5. Consider the circuit shown in Figure 4.
   a. Find the currents in each branch of this circuit.
   b. Find the real power and reactive power in each element (resistor, inductor, capacitor, and source).
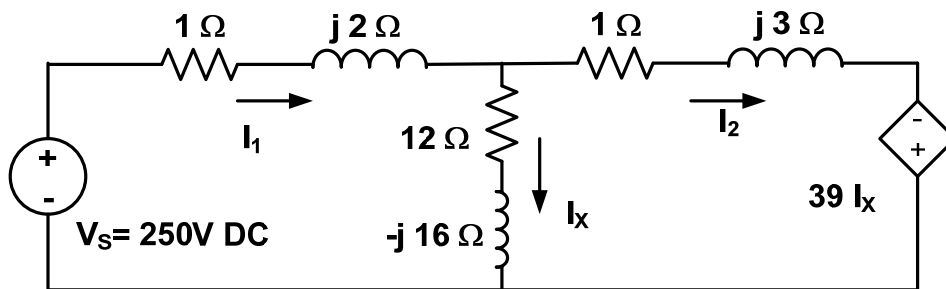

Figure 4. Two-loop power circuit.

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