Indian Institute of Technology, Delhi
EEL 101: Fundamentals of Electrical Engineering
Tutorial 1, 20th January, 2008

1. Consider an inductor of L Henry, and a capacitor of C Farad.

   (a) Assume that a current $i(t) = I_0 \cos(\omega t)$ flowing through the inductor. What will be the voltage across the inductor?

   (b) If $i(t) = I_0 e^{j(\omega t + \phi_0)}$, what will be the voltage across the inductor?

   (c) Assume that a voltage of $v(t) = V_0 \cos(\omega t)$ across the capacitor. What wil be the current through the capacitor?

   (d) If $v(t) = V_0 e^{j(\omega t + \phi_0)}$, what will be the current through the capacitor?

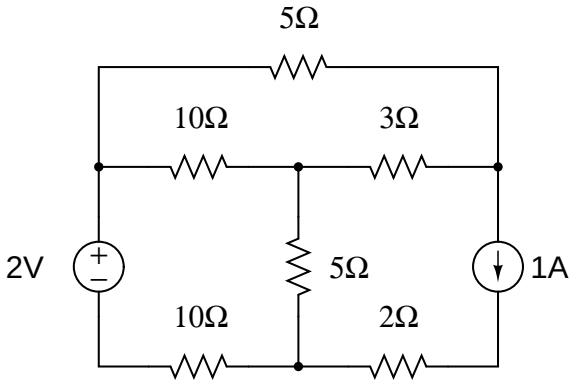

Figure 1:

2. In Fig. 1, compute the currents through all the branches and the voltages across all the elements. Use the node-voltage method, and the loop-current method to do the above. What are the powers consumed by each of the elements in the circuit? Is the total power consumed equal to zero?

3. In Fig. 2, what can you say about the current source in series with the voltage source? Solve for the currents through each of the elements, as well as the voltages across each of the elements in the circuit. Is the 1V voltage source consuming or providing power to the circuit?

4. In Fig. 3, apply source transformation to compute the current through the 1Ω resistor. Now compute the currents through all the branches, as well as the potential difference across each of the elements of the

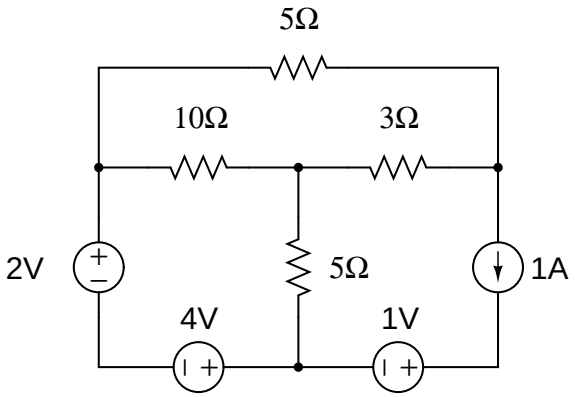

Figure 2:

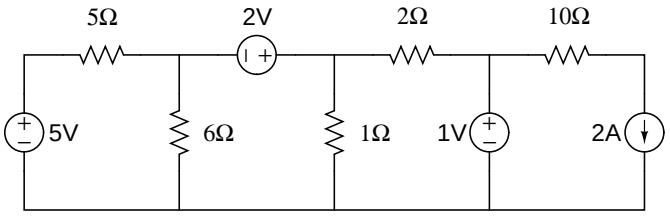

Figure 3:

circuit. Compute the power consumed by each element. Is the total power consumption equal to zero?

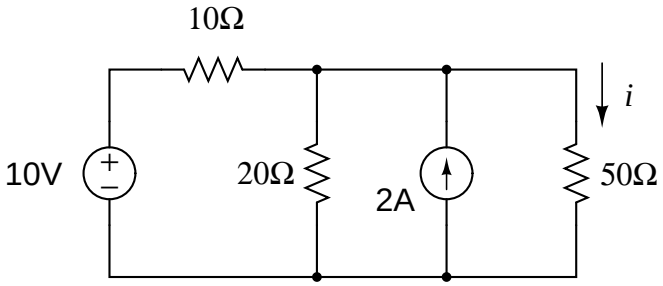

Figure 4:

5. In Fig. 4, apply Thevenin's and Norton's theorems to compute the current i through the 50Ω resistor.