EE 201 Name_____sec_____
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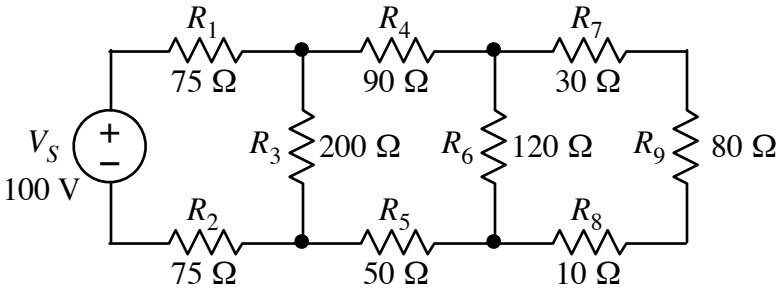
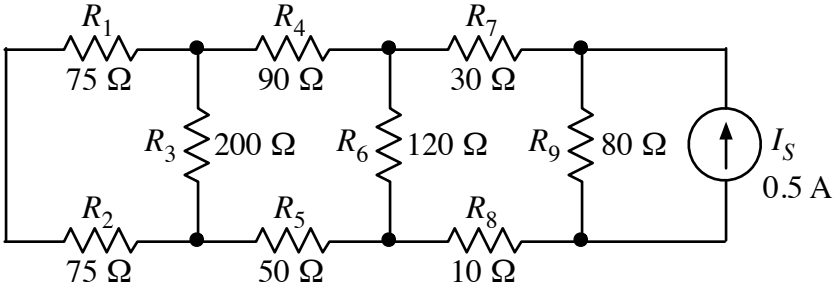
Problem 1

a. For the circuit at right, determine the power delivered by the source.



P_{VS} = _____

b. For the circuit at right, determine the power delivered by the source.



P_{IS} = _____

.

Put your answers on this page. Show all your work. If you used extra pages for calculations, attach them behind.

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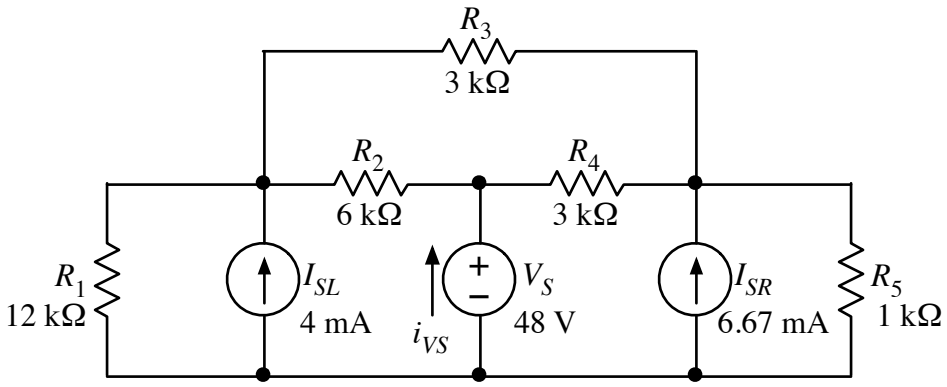
Problem 2

For the circuit, find the current flowing in the voltage source.



i_{VS} = _____

Put your answers on this page. Show all your work. If you used extra pages for calculations, attach them behind.

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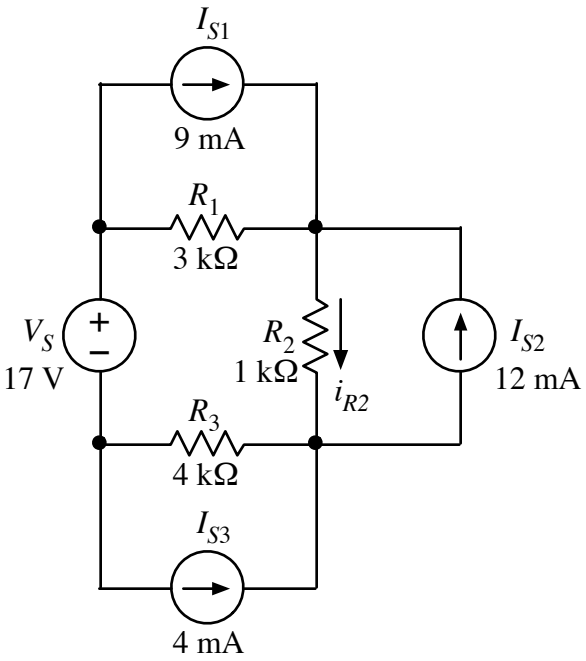
Problem 3

In the circuit at right, find the current i_{R2}.

i_{R2} = _____



Put your answers on this page. Show all your work. If you used extra pages for calculations, attach them behind.

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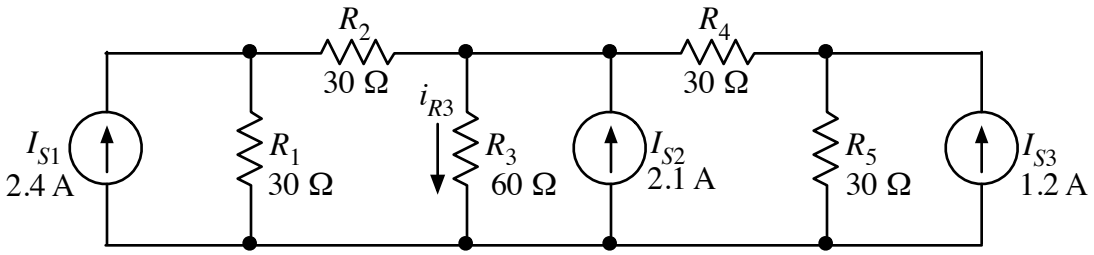
Problem 4

In the circuit below, find the current i_{R3}.



i_{R3} = _____

Put your answers on this page. Show all your work. If you used extra pages for calculations, attach them behind.

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EE 201 exam formula sheet

General info:

$$i = \frac{dQ}{dt} \qquad V = \frac{E}{Q}$$

Charge on an electron: 1.6×10^{-19} C

Ohm's law: $v_R = i_R R$

power

$$P_R = \frac{dE}{dt} = v \cdot i$$

power dissipated in a resistor

$$P_R = i_R^2 R = \frac{v_R^2}{R}$$

1 kW-hr = 3.6×10^6 joules

Resistor combinations:

Series

$$R_S = R_1 + R_2 + R_3 ...$$

Parallel

$$R_P^{-1} = R_1^{-1} + R_2^{-1} + R_3^{-1} ...$$

Dividers:

Voltage divider

$$v_n = \left[\frac{R_n}{R_1 + R_2 + R_3 ...} \right] V_S$$

Current divider

$$i_n = \left[\frac{R_n^{-1}}{R_1^{-1} + R_2^{-1} + R_3^{-1} ...} \right] I_S$$

Node voltage:

1. Identify nodes.
2. Choose ground.
3. Note any nodes with known voltages (due to voltage sources).
4. Identify resistor currents with directions.
5. Use KCL to relate currents at each node.
6. Use Ohm's law to relate resistor current to node voltages.
7. Solve node voltage equations.

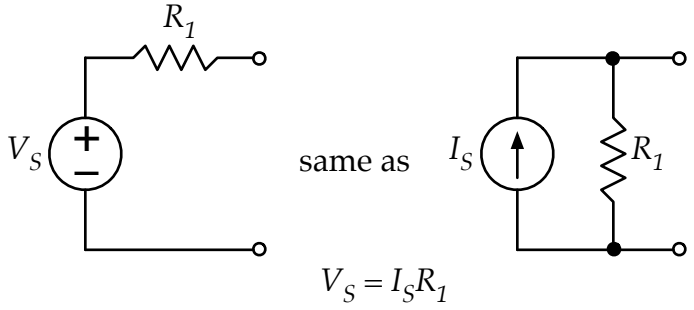
Mesh current:

1. Identify meshes.
2. Note any meshes with known currents (due to current sources).
3. Identify resistor voltages, with polarties.
4. Use KVL to relate voltages around each mesh.
5. Use Ohm's law to relate resistor voltages to node voltages. (Be careful with directions!)
6. Solve mesh current equations.

Superposition:

1. De-activate all sources except one. (Short voltage sources; open current sources.)
2. Solve for desired voltages and currents using reductions, dividers, and transformations to obtain partial results. (Can use node-voltage & mesh-current, too.)
3. Repeat for each independent source.
4. Add all partial results to obtain total result for each voltage and current.

Source transformations



$V_S = I_S R_1$

Put your answers on this page. Show all your work. If you used extra pages for calculations, attach them behind.