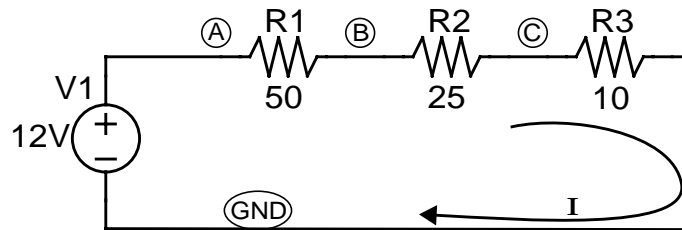


Homework set #2
ECE112

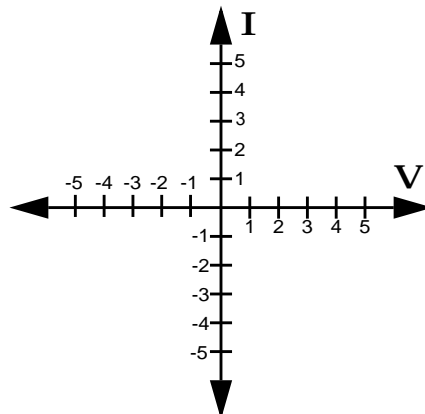
1. The starter motor in a 12V automobile ignition system has an internal resistance of 0.05 ohms.
 - a) How much current does it draw under operation?
 - b) The battery cables going to and from the starter motor have a combined resistance of 0.01 ohms, how much current is drawn under operation?
 - c) Under the conditions of (b), how much voltage appears across the starter motor?
 - d) What amount of resistance in the battery cables would drop the voltage across the starter motor to 6 volts?

2. Given that power dissipation in a component is calculated as:
 component dissipation = (voltage across component * current through component)
 how much internal resistance does a 120W, 125 volt light bulb have?

3. In the schematic diagram below, all the circuit nodes are labeled with circled letters to aid you in creating a spice netlist for the circuit. Calculate by hand the following values:
 - a) the current I, flowing in the circuit
 - b) the power dissipated by R1, R2, and R3
 - c) the power dissipated by V1
 - d) write the spice netlist for the circuit.

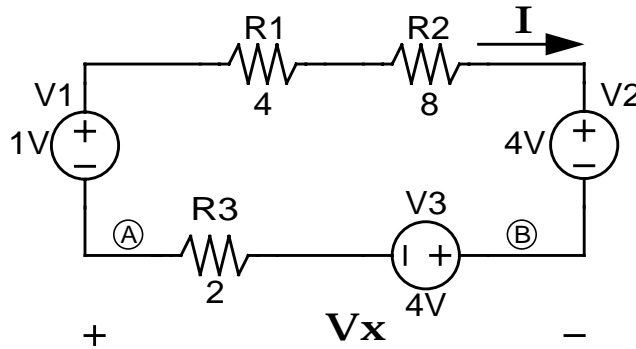


4. On a VI axis like one shown below, draw:
 - a) a 5v independent voltage source
 - b) a -2A independent current source
 - c) a 2 ohm resistor
 - d) a -4v independent voltage source
 - e) a 1A independent current source

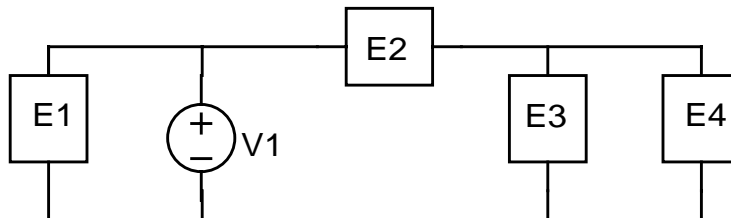


5. A robot's 3V battery pack has a capacity of 2850mAh. When the robot moves forward, its motor appears as a resistive load of 12 ohms. The forward speed of the robot is 0.5ft/sec. How many inches will the robot travel before it stops? Assume the motor will run until the last coulomb of charge has been consumed.

6. For the circuit below, find I , V_x , and the power dissipated in each element. The voltage V_x is measured between nodes A and B.



7. A schematic diagram is shown below with a voltage source and three unknown circuit elements E1, E2, E3 and E4. Circle the correct answer for the questions below.



- The voltage across E3 _____ the voltage across E4.
 - is the same as
 - is different from
 - is unrelated to
- The current through E3 _____ the current through E4.
 - is the same as
 - is different from
 - may be unrelated to
- The current through E2 is equal to the current through E3 plus the current through E4.
 - true
 - false
 - can't tell
- The voltage across V1 is equal to the sum of the voltages across E2 and E3 or E4.
 - true
 - false
 - can't tell

8. For the circuit below, determine the power dissipation for each numbered element.

