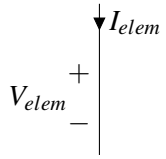
EECS 16A Designing Information Devices and Systems I
Fall 2022 Discussion 4A

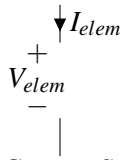
1. Circuit Components and Ohm's Law

(a) We will look at the $I-V$ characteristics of different circuit components. For each of the components listed below plot the $I_{elem}-V_{elem}$ characteristic curves.

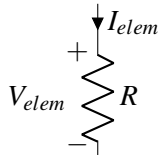
i. Wire



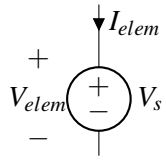
ii. Open Circuit



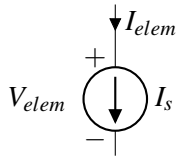
iii. Resistor



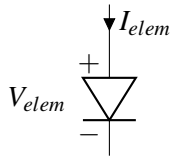
iv. Voltage Source



v. Current Source

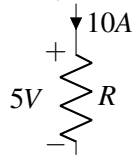


vi. Diode

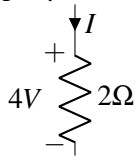


(b) Use Ohm's Law to find the missing component values in the circuits below.

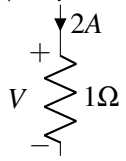
i. $R=?$



ii. $I=?$



iii. $V=?$



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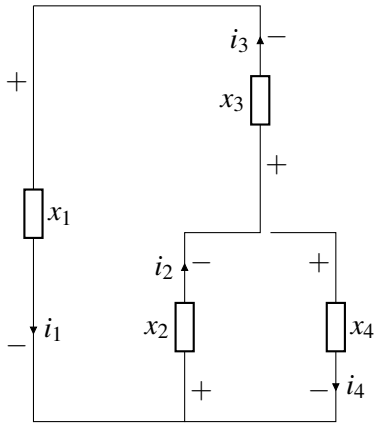
2. Label the nodes

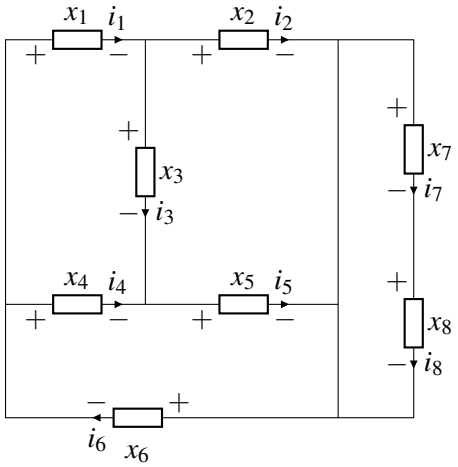


(a) In the circuit shown above, identify and label all the nodes.

(b) Choose a node to be the reference node and find all the potentials across elements in the circuit in terms of the node potentials.

(c) Write as many KCL equations as you can for the circuit

(d) Write as many KVL equations as you can for the circuit



(e) In the circuit shown above, identify and label all the nodes.

(f) Choose a node to be the reference node. What is the potential across the elements x_6 and x_7 in terms of node potentials?

(g) Write a KCL equation involving i_1 and a KCL equation involving i_5

(h) Write a KVL equation involving V_{x_3} and a KVL equation involving V_{x_6}