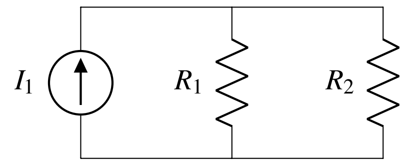
EECS 16A Designing Information Devices and Systems I
Spring 2018 Discussion 6A

1. A Slightly More Complicated Circuit

For the circuit shown below, find the voltages across all the elements and the currents through all the elements.



(a) In the above circuit, pick a ground node. Does your choice of ground matter?

(b) With your choice of ground, label the node potentials for every node in the circuit.

(c) Label all of the branch currents. Does the direction you pick matter?

(d) Draw the $+/-$ labels on every element. What convention must you follow?

(e) Set up a matrix equation in the form $\mathbf{A}\vec{x} = \vec{b}$ to solve for the unknown node potentials and currents. What are the dimensions of the matrix $\mathbf{A}$?

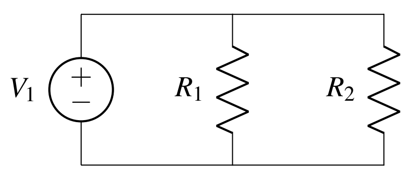
(f) Use KCL to find as many equations as you can for the matrix.

(g) Use IV relations to find the remaning the equations for the matrix.

(h) Solve the system of equations if $I_1 = 5\,\text{A}$, $R_1 = 5\,\Omega$, and $R_2 = 10\,\Omega$.

2. Another Circuit

For the circuit shown below, find the voltages across all the elements and the currents through all the elements.



(a) In the above circuit, pick a ground node. Does your choice of ground matter?

(b) With your choice of ground, label the node potentials for every node in the circuit.

(c) Label all the branch currents. Does the direction you pick matter?

(d) Draw the $+/-$ labels on every element. What convention must you follow?

(e) Set up a matrix equation in the form $\mathbf{A}\vec{x} = \vec{b}$ to solve for the unknown node potentials and currents. What are the dimensions of the matrix $\mathbf{A}$?

(f) Use KCL to find as many equations as you can for the matrix.

(g) Use IV relations to find the remaining equations for the matrix.

(h) Solve the system of equations if $V_1 = 5\,\text{V}$, $R_1 = 5\,\Omega$, and $R_2 = 10\,\Omega$.