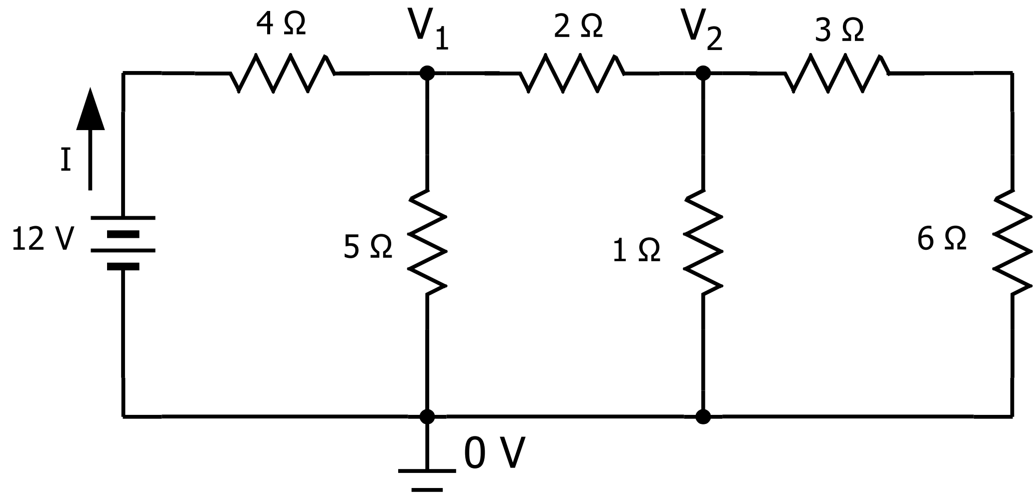
EE3 Fall 2021
Practice Problems 2



1. This is a similar circuit to that in Lecture1. Only the resistor values are different. It can be solved using series-parallel equivalents. But solve it using the NVA process below.
   a. Assuming that all of the currents at Node 1 (where V_1 is) are *leaving* the node, write an Ohm's Law expression for the current going through the 4 Ω resistor.
   b. Under the same assumption, write an Ohm's Law expression for the current through the 5 Ω resistor.
   c. Continuing, write an expression for the current through the 2 Ω resistor.
   d. Now, following the same procedure, write Ohm's Law expressions for the three currents leaving Node 2.
   e. Now, combine the answers to 1a,b,c into a KCL equation.
   f. Combine the three answers to 1d into a KCL equation.
2. You now have 2 equations in 2 unknowns. Solve them for V_1 and V_2.
3. Now that you know V_1, you can compute I.

2. $V_1 = 3.7744\,\text{V}$; $V_2 = 1.1714\,\text{V}$

3. $I = 2.06\ \text{A}$

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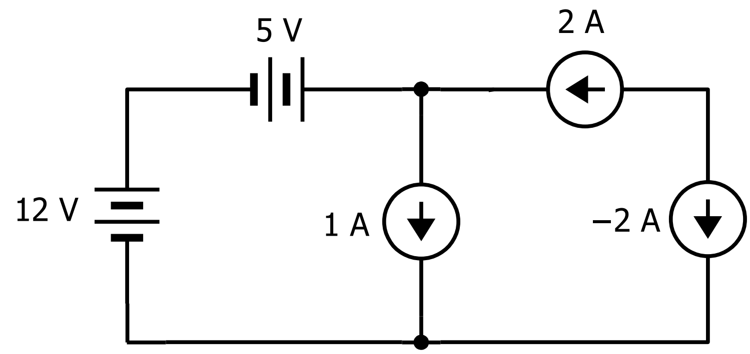
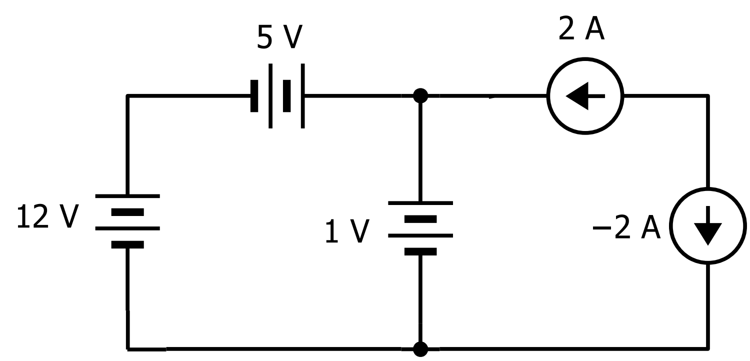
4. Is this a "legal" circuit? If not, why not?



5. Is this a "legal" circuit? If not, why not?



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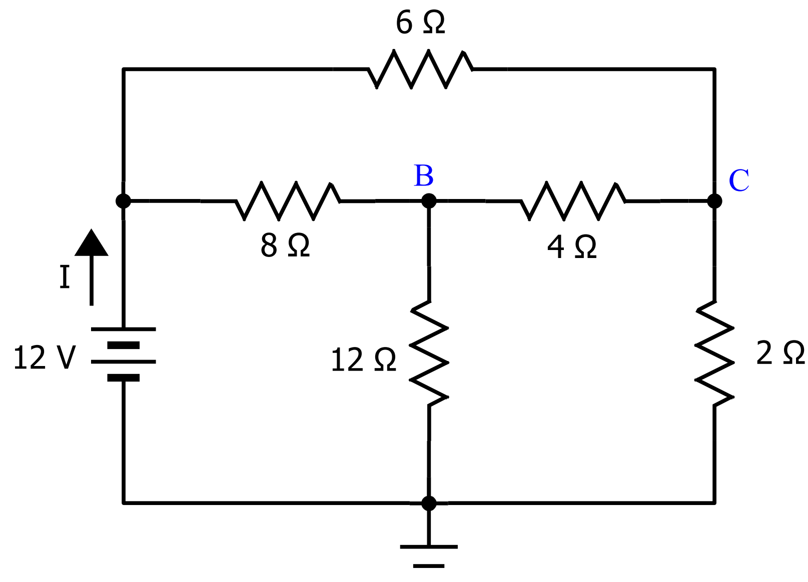
6. Using your knowledge of Node Voltage Analysis (NVA),find the current I.



I = 2.24 A

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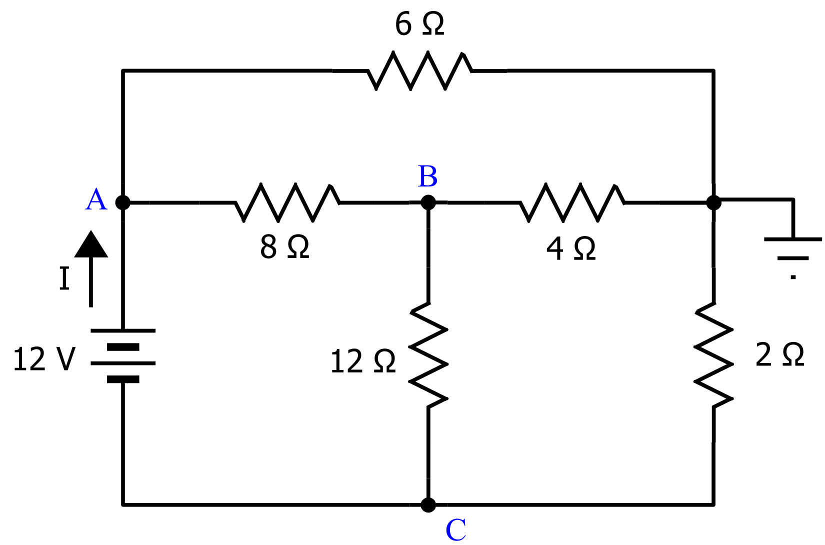
7. This is the same circuit as Problem 6. Using your knowledge of Node Voltage Analysis (NVA),find the current I. HINT: Use I as an unknown fourth variable. (Note: with the reference node at a different location, you now have 3 unknown nodes. But you also know the voltage relationship between 2 of them.)



I = 2.24 A

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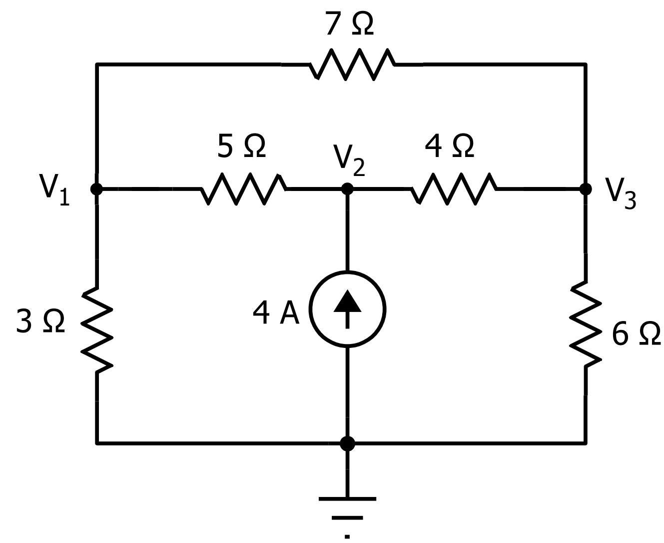
8. This is almost the circuit that we studied in Problem 1. This time, we have replaced the battery with a current source. Find the three voltages. You may need to dig a little to work this problem.



$V_1 = 7.2$ V
$V_2 = 17.4$ V
$V_3 = 9.6$ V