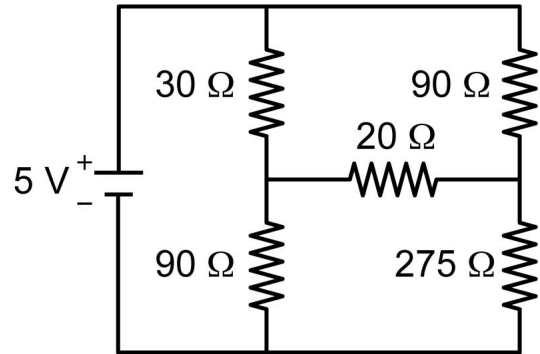

PHYS 1220 Group Work: Kirchhoff's laws

Here is a circuit that cannot be solved using the rules for grouping series and parallel resistors.

1. Set up a system of equations that define the circuit.



2. Convert the equations to a spreadsheet and solve to find the currents through and voltages across each resistor.
3. Verify that the currents and voltages are correct.
 - A. Check that the currents into and out of each node obey the junction rule.
 - B. Check that the voltages around three independent loops obey the loop rule.
4. Build this circuit yourself. Don't try to exactly match the resistances; just make a circuit with five resistors and a voltage source connected in this way.
 - A. Using the measured resistances of the resistors in your circuit, set up the system of equations to model the circuit. You shouldn't need to make any new equations: you should be able to substitute the source voltage and the resistances into the equations you already have.
 - B. Use the spreadsheet to solve the system of equations to find the voltages across and currents through all five resistors.
 - C. With the circuit energized, measure the voltages and currents to verify that the spreadsheet found the correct values.