Lab 4
DC Circuits

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DC Circuits

- Ohm's Law
  - $V = IR$
- Resistors in parallel:
  - $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$
- Resistors in series:
  - $R_{eq} = R_1 + R_2 + R_3$
- Equivalent conductance:
  - $G = \frac{I}{V}$
- Individual conductance:
  - $G_i = \frac{1}{R_i}$

Equipment

- Power supply
- Digital multi-meter
- Ammeter
- Resistance board
- Resistors

Procedure

- Ohm's Law
  - Measure resistance with multimeter set to ohms
  - Connect power supply, multimeter, and ammeter to each resistor as shown in Fig 1
  - Measure the current through each resistor at 5 different voltages
- Voltage Law
  - Set up as shown in Fig. 2
  - Measure voltage across source
  - Measure voltage across each of the 3 resistors and compare with voltage across source
- Current Law
  - Set up as shown in Fig. 3
  - Measure voltage across R1, R2, and R3 and calculate their respective currents
  - Verify that $I_1 = I_2 + I_3$

Procedure

- Resistors in Series
  - Set up as shown in Fig. 2
  - Measure the current and determine the equivalent resistance
  - Verify that $R_{eq} = R_1 + R_2 + R_3$
  - Repeat for all three combinations of 2 resistors
- Resistors in Parallel
  - Set up as shown in Fig. 4
  - Measure current and determine equivalent conductance
  - Verify that $G_{eq} = G_1 + G_2 + G_3$
  - Repeat for all three combinations of 2 resistors

Procedure

- Resistors in Series-Parallel
  - Set up as shown in Fig. 3
  - Measure current when a known voltage is applied and determine equivalent resistance
  - Compare with the theoretical value calculated from the know values of the three resistors
- Resistors in Parallel-Series
  - Set up as shown in Fig. 5
  - Measure current when a known voltage is applied and determine equivalent resistance
  - Compare with the theoretical value calculated from the know values of the three resistors