

Name \_\_\_\_\_

Date \_\_\_\_\_

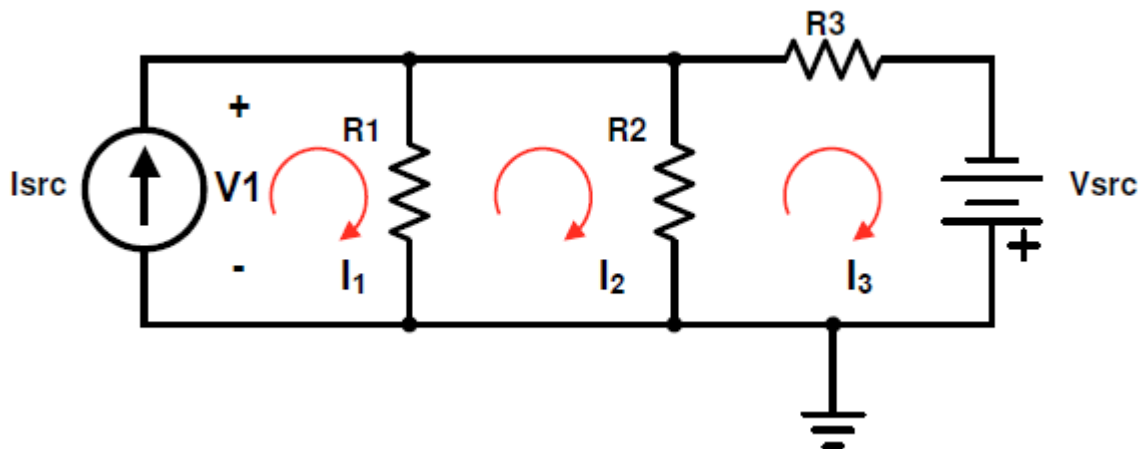


Fig. 1. Circuit to be evaluated.  $V_{src} = 15\text{ V}$ ,  $I_{src} = 12.5\text{ mA}$ ,  $R_1 = 4.7\text{ k}\Omega$ ,  $R_2 = 2.2\text{ k}\Omega$ ,  $R_3 = 3.3\text{ k}\Omega$ .

Exercise 1. Theory

- Use the mesh method to find the mesh currents  $I_1$ ,  $I_2$ , and  $I_3$ . Do your work on this worksheet.
- Find  $V_1$ , the voltage across the current source
- Find the currents through each resistor,  $I(R_1)$ ,  $I(R_2)$ , and  $I(R_3)$
- Enter the resistor currents in Table 1

### Exercise 2. Simulation

- Capture the Fig. 1 schematic in Multisim. Add and complete the course title block.
  - Save as LastName\_FirstName\_Assign5.ms14
- Measure the voltage across  $I_{src}$  and display on the schematic.
- Measure the current through each resistor and display each value on the schematic.
  - $I(R1)$  will represent the current entering the + terminal of resistor 1
  - Remember that the mesh currents do not necessarily equal the “real” currents
- Simulate the circuit and record the voltage and current measurements in Table 1.
- Prepare a PDF version of your completed schematic (including all of the above measurements) for upload, LastName\_FirstName\_Assign5.pdf

### Exercise 3. Measurement

- Build the circuit from Fig. 1 on your breadboard.
- Using one set of banana-to-alligator leads, connect the red test lead to the positive terminal and the black test lead to the negative terminal of Channel 2 (Green). This will be the current source.
- Using the second set of banana-to-alligator leads, connect the red test lead to the positive terminal and the black test lead to the negative terminal of Channel 3 (Blue). This will be the voltage source.
  - Consider the polarity of the voltage source when connecting the alligator clips to your circuit.
- Select the Channel 2 output selection key and adjust the current to 12.5 mA. Press Enter to complete the entry.
  - Note: By limiting the current to 12.5 mA, this channel will operate as a current source in constant current (CC) mode.
- Select the Channel 3 output selection key and adjust the voltage to 15 V. Press Enter to complete the entry.
  - As a safety precaution, set the current for Channel 3 to 100 mA. This will have no impact on the performance of the circuit but will limit the current in the case of a short.
- Turn on the outputs for Channel 2 and Channel 3.
- Using the third set of banana-to-alligator leads, use the DMM to measure  $V1$ . Record the result in Table 1.
- Turn off the outputs and reconfigure the DMM test leads to measure the current through  $R1$ . Turn the outputs back on and record the results in Table 1.
- Repeat the previous step for  $R2$  and  $R3$ .

Table 1. Comparison of Analysis Results

	Theory	Simulation	Measurements
$V1$ (V)			
$I(R1)$ (mA)			
$I(R2)$ (mA)			
$I(R3)$ (mA)			

**At the end of the lab session:**

1. Upload your schematic in PDF form to the assignment's Bb Learn page
2. Turn in a completed worksheet