

## Laboratory 2

# Resistor Combinations, KCL, KVL, Voltage and Current Dividers

## Objectives

- Verify KCL and KVL
- Learn how to use voltage/current division and verify theoretical results with simulation results.

## Equipment and components

- A computer
- Matlab software

## Preliminary

1. Refer to Chapters 2 and 3 of the textbook if necessary.
2. Complete the theoretical calculations before attending this lab and fill in your results in the Tables 1 - 6.

## Procedure

1. Open Matlab
2. Create Simulink model of the circuit as shown below by following the procedures in Lab 1.
3. Fill in your simulation results in Table 1.

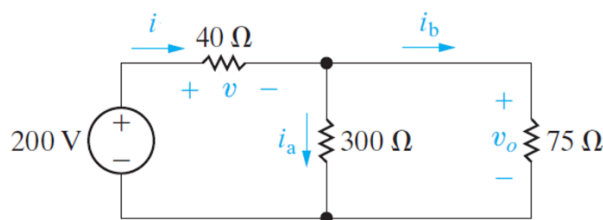


Table 1 (The source = 200 V)

	Simulation Results	Theoretical Results
$i$		
$i_a$		
$i_b$		
$v$		
$v_o$		

- a) What is the sum of  $i_a$  and  $i_b$  ? Sum = \_\_\_\_\_. What is  $i$  ? Explain.  
 b) What is the sum of  $v$  and  $v_o$  ? Sum = \_\_\_\_\_. Explain.  
 c) Are your simulation results consistent with your theoretical results?  
 d) Set the voltage source to be 100 V and repeat the above steps. Fill in the table below. Comparing the results in Table 2 with those in Table 1, what do you observe?

Table 2 (The source = 100 V)

	Simulation Results	Theoretical Results
$i$		
$i_a$		
$i_b$		
$v$		
$v_o$		

- e) Set the voltage source to be  $-200$  V and repeat the above steps 1, 2, and 3. Fill in the table below. Comparing the results in Table 3 with those in Table 1, what do you observe?

Table 3 (The source =  $-200$  V)

	Simulation Results	Theoretical Results
$i$		
$i_a$		
$i_b$		
$v$		
$v_o$		

4. Create the Simulink model of the following circuit and find  $i_g$  and  $i_o$ . Fill in Table 4 as shown below. Are the simulation results consistent with your theoretical results?

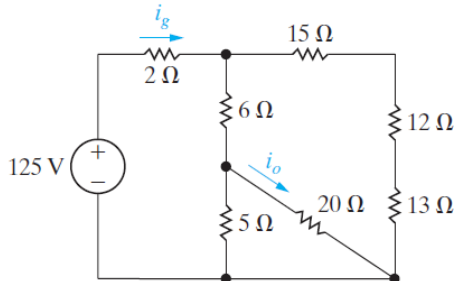


Table 4 Current Division

	Simulation Results	Theoretical Results
$i_g$		
$i_o$		

5. Create a Simulink model of the following circuit and find  $v_1, v_2$  and  $i_g$ . Are the simulation results consistent with your theoretical results? Fill in Table 5 as shown below.

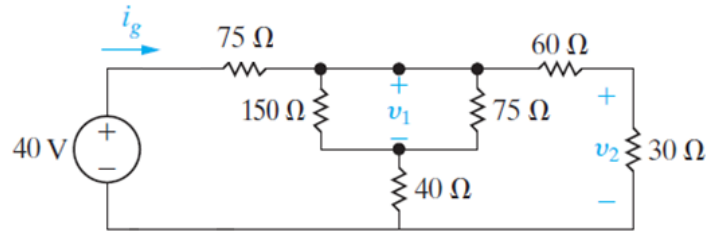


Table 5 Voltage Division

	Simulation Results	Theoretical Results
$v_1$		
$v_2$		
$i_g$		

6. Create the Simulink model of the following circuit and find  $v_1, v_2$  and  $i_g$ . Are the simulation results consistent with your theoretical results? Fill in Table 6 as shown below. Compare the results in Table 5 and Table 6, what do you observe? Explain.

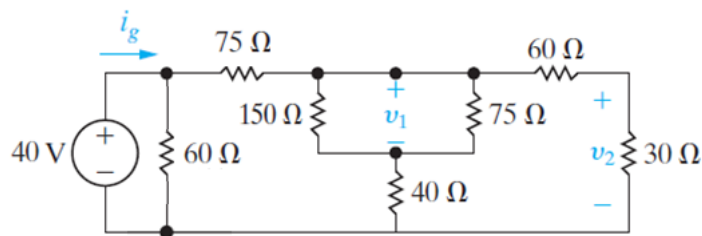


Table 6 Voltage Division

	Simulation Results	Theoretical Results
$v_1$		
$v_2$		
$i_g$		

## Questions and conclusions

- Use tables and graphs to explain your results.
- Summarize your findings and explanations in response to the questions posed in this lab.