

# ECE 109L - EQUIVALENT CIRCUITS - LAB 18

## THEVENIN'S THEOREM - PART I

SUMMER 2007

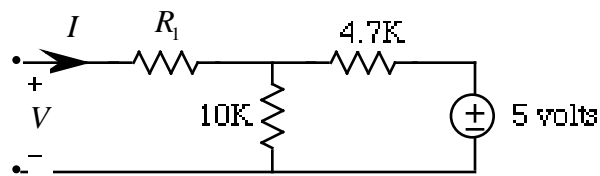
A.P. FELZER

### OBJECTIVE

In the last lab we found equivalent resistances of circuits containing just resistors. The objective of this lab is to take the first step towards finding equivalent circuits of resistor circuits containing not only resistors but also sources. The objective of this lab in particular is to find  $V$  as a function of  $I$  for such circuits.

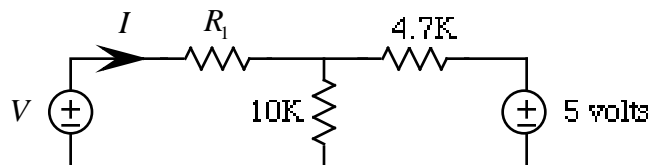
### LAB

1. Given the following resistor circuit



PARTNER 1:  $R_1 = 2K$       PARTNER 2:  $R_1 = 4.7K$

- a. **PreLab** - Measure your resistor values. Compare with nominal values
- b. **PreLab** - Use node equations to find  $V$  as a function of  $I$  for our circuit with a voltage source  $V$  connected as follows



Note that this is exactly what we did in previous labs to find  $V$  as a function of  $I$  when our circuits just contained resistors.

- c. **PreLab** - Use Mathcad to obtain a graph of your function in part (b). Make your graph large enough to fill a page
  - d. **PreLab** - Describe your graph in part (c). How in particular does it differ from those of purely resistor circuits
  - e. Connect a voltage source  $V$  to the above circuit and then measure  $I$  for a bunch of values of  $V$ . Be sure to include the point  $I = 0$
  - f. Put your data points on your Mathcad graph
  - g. How well do your data points fit the line
  - h. Make use of your equation for  $V$  as a function of  $I$  to predict  $I$  when  $V = -2.5$  volts
  - i. Measure  $I$  when  $V = -2.5$  volts
  - j. Compare your measured value of  $I$  with your calculated value
  - k. Explain why only two data points are needed to find the equation for  $V$  as a function of  $I$
2. Repeat parts (a)-(h) in Problem (1) for a circuit that you make up - including the **PreLab**