

# ECE 109L - TRANSFER FUNCTIONS - LAB 25

## SUPERPOSITION IN RESISTOR CIRCUITS

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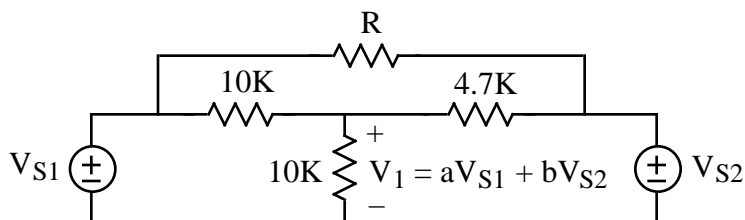
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### OBJECTIVE

The objective of this Lab is to demonstrate that superposition works for resistor circuits.

### LAB

1. Given the following resistor circuit



with  $V_1 = aV_{S1} + bV_{S2}$

- Measure your resistors. Then compare with nominal values.
- First measure  $V_1$  when  $V_{S1} = 5$  volts and  $V_{S2} = 2$  volts and then measure  $V_1$  when  $V_{S1} = 2$  volts and  $V_{S2} = 5$  volts. As always put your results in a Table
- Now make use of your results in part (b) to calculate the coefficients  $a$  and  $b$  in  $V_1 = aV_{S1} + bV_{S2}$
- Use your superposition equation  $V_1 = aV_{S1} + bV_{S2}$  to predict  $V_1$  when  $V_{S1} = 5$  volts and  $V_{S2} = -7$  volts
- Measure  $V_1$  when  $V_{S1} = 5$  volts and  $V_{S2} = -7$  volts
- Compare your calculated and predicted values of  $V_1$
- In parts (b) and (c) we used nonzero values of both  $V_{S1}$  and  $V_{S2}$  to obtain equations for the coefficients  $a$  and  $b$ . This is fine but the calculations are simpler if we first do the measurements with  $V_{S2} = 0$  volts and then with  $V_{S1} = 0$  volts. To demonstrate this result
  - Draw the circuit with  $V_{S1} = 5$  volts and  $V_{S2} = 0$  volts
  - Measure  $V_1$
  - Draw the circuit with  $V_{S1} = 0$  volts and  $V_{S2} = 5$  volts
  - Measure  $V_2$
- Make use of your results in part (g) to directly calculate  $a$  and  $b$
- Verify that your results for the coefficients  $a$  and  $b$  calculated in parts (c) and (h) are the same.