

ECE 109L - TRANSFER FUNCTIONS - LAB 25

SUPERPOSITION IN RESISTOR CIRCUITS

SUMMER 2007

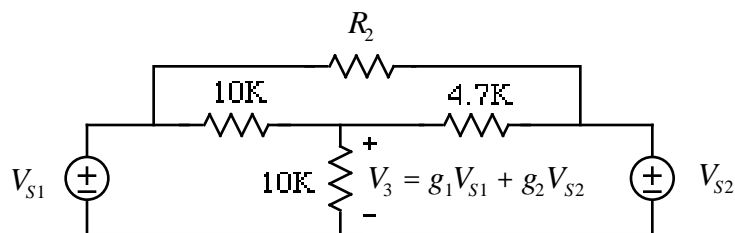
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OBJECTIVE

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

LAB

1. Given the following resistor circuit



PARTNER 1: $R_2 = 4.7K$ PARTNER 2: $R_2 = 10K$

with $V_3 = g_1 V_{S1} + g_2 V_{S2}$

- a. Measure your resistors. Then compare with nominal values.
- b. First measure V_3 when $V_{S1} = 5$ volts and $V_{S2} = 2$ volts and then measure V_3 when $V_{S1} = 2$ volts and $V_{S2} = 5$ volts. As always put your results in a Table
- c. Now make use of your results in part (b) to calculate the coefficients g_1 and g_2 in $V_3 = g_1 V_{S1} + g_2 V_{S2}$
- d. Use your superposition equation $V_3 = g_1 V_{S1} + g_2 V_{S2}$ to predict V_3 when $V_{S1} = 5$ volts and $V_{S2} = -7$ volts
- e. Measure V_3 when $V_{S1} = 5$ volts and $V_{S2} = -7$ volts
- f. Compare your calculated and predicted values of V_3
- g. In parts (b) and (c) we used nonzero values of both V_{S1} and V_{S2} to obtain equations for the coefficients g_1 and g_2 . 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
 - (1) Draw and then build the circuit with $V_{S1} = 5$ volts and $V_{S2} = 0$ volts
 - (2) Measure V_3
 - (3) Draw and then build the circuit with $V_{S1} = 0$ volts and $V_{S2} = 5$ volts
 - (4) Measure V_3
- h. Make use of your results in part (g) to directly calculate g_1 and g_2
- i. Verify that your results for the coefficients g_1 and g_2 calculated in parts (c) and (h) are the same.