ECE 207L - CONTROLLED SOURCES - LAB 5
CIRCUITS WITH CONTROLLED VOLTAGE SOURCES - PART I

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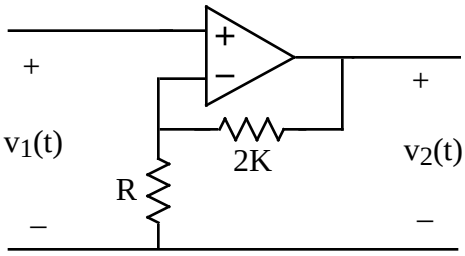
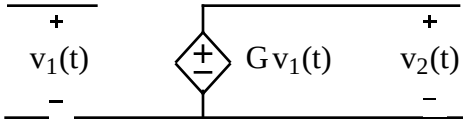
OBJECTIVE

In Lab 4 we made use of op amps as follows



PARTNER 1: R = 2K PARTNER 2: R = 4.7K

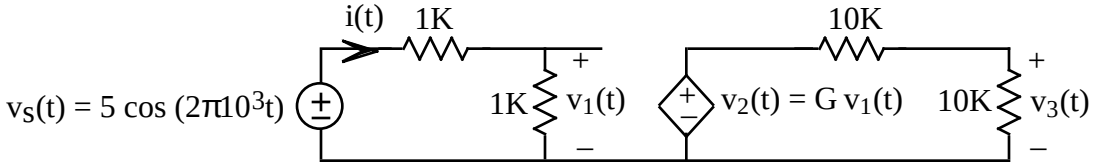
to build voltage controlled voltage sources of the following form



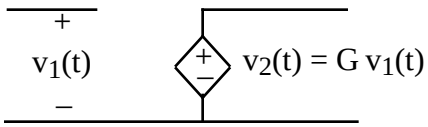
with gains G depending on the value of R. The objective of this lab is to build and analyze a simple resistor circuit containing your voltage controlled voltage source.

LAB

1. Given the following circuit containing a voltage controlled voltage source



   a. First redraw the circuit diagram with the controlled source as follows



      replaced by your op amp circuit from the last lab. Be sure to show the power supplies and the pin numbers of the op amp. What is the gain G of your controlled source.
   b. Then measure your resistor values. Compare with nominal values.
   c. Now build the circuit and measure $v_1(t)$, $v_2(t)$ and $v_3(t)$. Again be sure to lay out your circuit exactly like your diagram
   d. Calculate $v_1(t)$, $v_2(t)$ and $v_3(t)$
   e. Compare the amplitudes of your measured and calculated voltages $v_1(t)$, $v_2(t)$ and $v_3(t)$
   f. Calculate i(t) from your measured values.
   g. Use your measured data to calculate

$$R_{eq} = \frac{v_s(t)}{i(t)} \qquad \text{and} \qquad G_3 = \frac{v_3(t)}{v_s(t)}$$

h. Use your results in part (g) to predict i(t) and $v_3(t)$ when $v_S(t) = 8 \cos (2\pi 10^3 t)$

i. Measure i(t) and $v_3(t)$ when $v_S(t) = 8 \cos (2\pi 10^3 t)$

j. Compare the amplitudes of your measured and calculated values of i(t) and $v_3(t)$