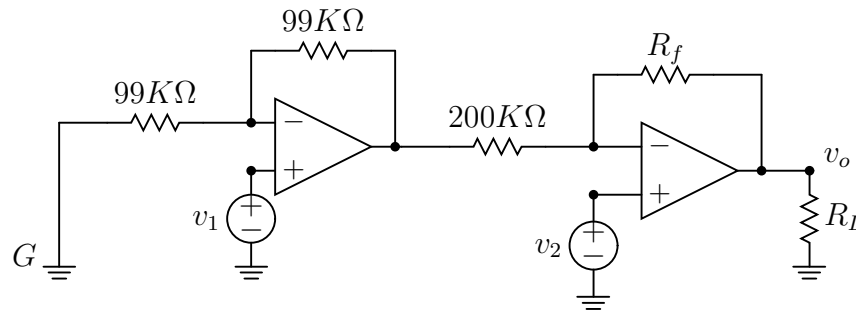


332:221 Principles of Electrical Engineering I – Fall 2004

Quiz 4

Student's name in capital letters:



Assume that the Op-Amps are ideal. Determine the value of R_f so that

$$v_o = K(v_2 - v_1)$$

where K is a constant.

What is the value of K for your chosen R_f ?

Does the value of v_o depend on R_L ?

Do not use any formulae you might have learned for a particular configuration or other. Show all your work.

Solution: Let the output of the left Op-Amp be v_{o1} . Then, the node equation at the negative terminal of left Op-Amp is given by

$$\frac{v_1}{99K} + \frac{v_1 - v_{o1}}{99K} = 0 \Rightarrow v_{o1} = 2v_1.$$

Next, let us write the node equation at the negative terminal of right Op-Amp as

$$\frac{v_2 - v_{o1}}{200K} + \frac{v_2 - v_o}{R_f} = 0 \Rightarrow v_o = \left[1 + \frac{R_f}{200K}\right] v_2 - \frac{R_f}{200K} v_{o1}.$$

In order to get the given value of v_o , we must have $R_f = 200K\Omega$. In this case, we see $K = 2$. The value of v_o does not depend on R_L .