Lab 8 Summing Amplifier (Rev.1)

1. Assemble the circuit in Fig. 1 and also simulate in MultiSim.

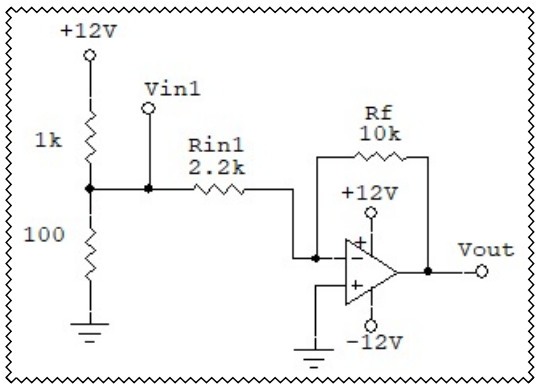

Fig. 1

2. Calculate voltage gain 1: $AV_1 = \frac{R_F}{Rin_1} =$

3. Calculate Vin1:

4. Measure Vin1: Vin1= _____

   (MultiSim measurement): Vin1 = _____

5. Calculate Vout: $V_{OUT} = Vin_1(AV_1) =$

6. Measure Vout: Vout = _____ (Multisim measurement:) Vout = _____

This circuit has taken an input voltage and amplified this voltage but also inverted the output so that a negative voltage has been produced. Now would we need to amplify a second input voltage and add or "sum" the two voltages together but the results will be inverted and a again, a negative value will be produced.

7. Modify the circuit as in Fig. 2:

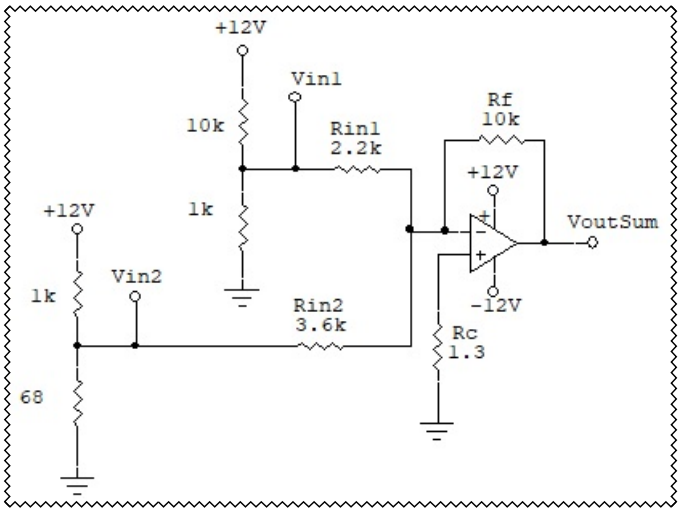

Fig. 2

8. Calculate Vin2: Vin2 = _____

9. Measure Vin 2: Vin2 = _____

   (MultiSim measurement:) Vin2 = _____

10. Calculate voltage gain 2: $AV_2 = \frac{R_F}{Rin_2} =$

11. Calculate Vout2: $Vout_2 = Vin_2(AV_2) =$

12. Calculate $Vout_{SUM}$ by adding (summing) Vout1 plus Vout2:

$$Vout_{SUM} = Vout_1 + Vout_2 =$$

13. Measure $Vout_{SUM}$: $Vout_{SUM}$ = _____ (MultiSim measurement:) $Vout_{SUM}$ = _____

How do the calculated, measured and MultiSim values compare? What causes the differences in values?

14. The summing amplifier has added two voltages, but has inverted the output. Modify the circuit as in Fig. 3 and pick values for Rf and Rin3 so that the voltage gain is 1 but that the output is inverted and a positive value is created at $Vout_{Final}$:

15. Rf = _____

Rin3 = _____

16. Measure $Vout_{Final}$:

$Vout_{Final}$ = _____

(MultiSim) $Vout_{Final}$ = _____

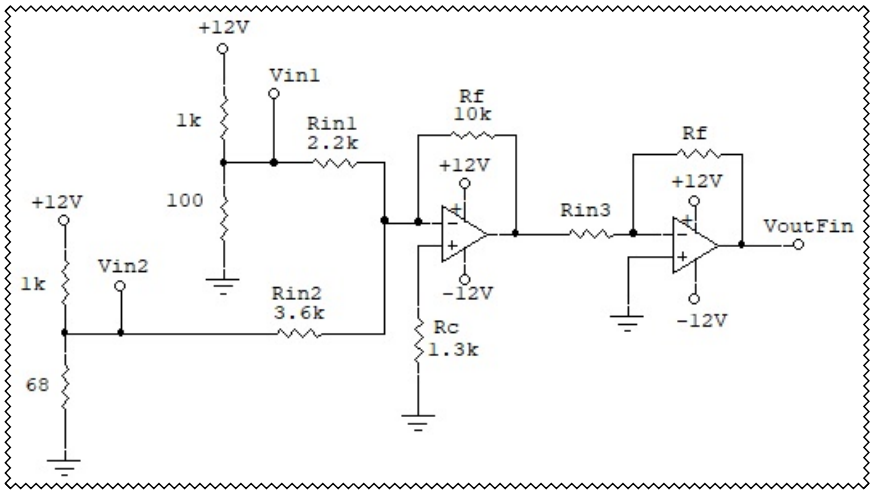

Fig. 3

17. Is the final output a positive value? How do the simulated values and the real values compare?

18. Calculate the compensating resistors: