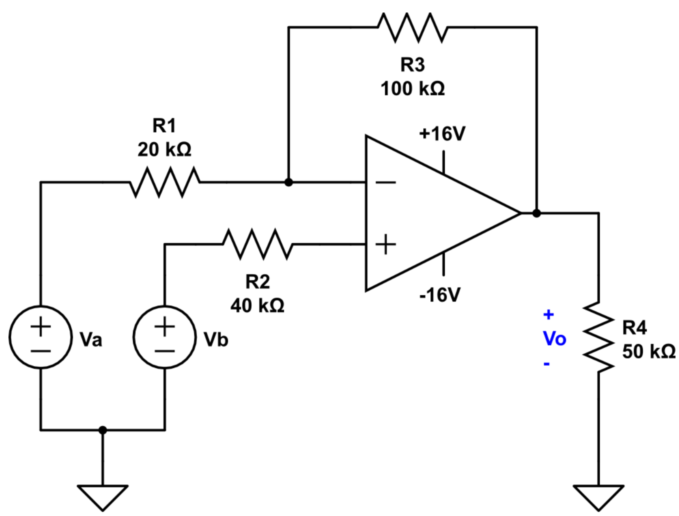
ENGR 2910-101: Circuit Analysis Instructor: Brian Rashap
Homework 6: Due: See Brightspace

Question 1 [4]
Assume the Op Amp below is ideal



(a) Calculate v_o if $v_a = 4V$ and $v_b = 0V$.

(b) Calculate v_o if $v_a = 2V$ and $v_b = 0V$.

(c) Calculate v_o if $v_a = 2V$ and $v_b = 1V$.

(d) Calculate v_o if $v_a = 1V$ and $v_b = 2V$.

(e) If $v_0 = 1.6V$, specify the range of v_a such that the amplifier does not saturate.

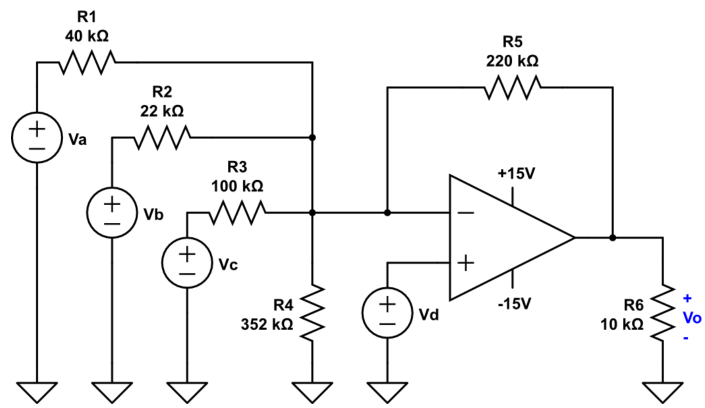
Question 2 [4]

(a) Design an inverting amplifier with a gain of 4. Use an ideal ops amp, a $30k\Omega$ resistor in the feedback path, and $\pm 12V$ power supplies.

(b) Using your design from part (a), determine the range of input voltages that will keep the op amp in the linear operating regions.

(c) Suppose you wish to amplify a $2V$ signal, using your design from part (a) with a variable feedback resistor. What is the largest value for the feedback resistance that keeps the op amp in the linear operating region? Using this resistance value, what is the new gain of the inverting amplifier.

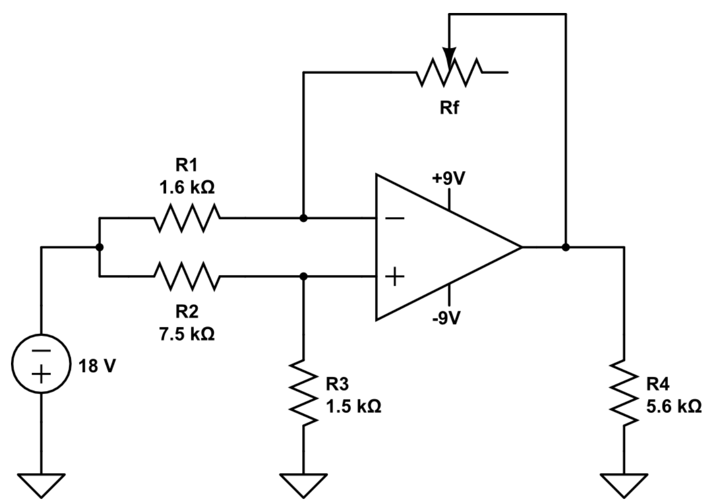
Question 3 [4]
Consider the ideal op amp below:



(a) Find v_o, if $v_a = 4V$, $v_b = 9V$, $v_c = 13V$, and $v_d = 8V$.

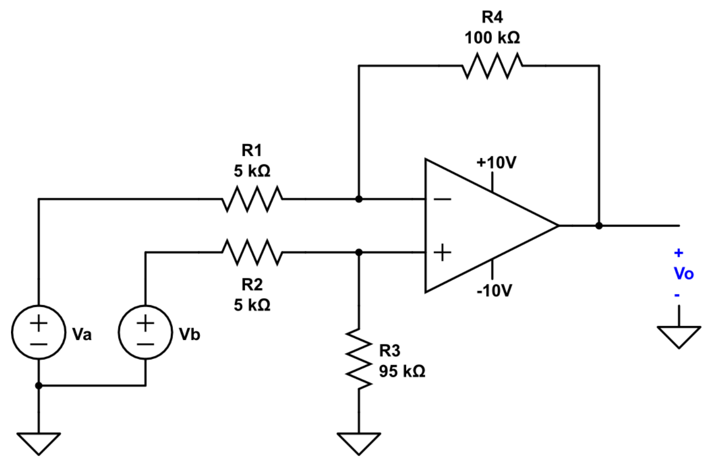
(b) Assume v_b, v_c, and v_d retain their values from part (a). Specify the range of v_a such that the op amp operates in within the linear region.

Question 4 [4]
The resistor R_f in the circuit below is adjusted until the ideal op amp saturates. Specify R_f in kilohms.



Question 5 [4]

In the differential amplifier shown below, find:



(a) The differential mode gain

(b) The common mode gain

(c) the CMRR