Problem # 1

The op amp in the circuit is ideal.

a) Calculate v_o if $v_a = 4\text{V}$ and $v_b = 0\text{V}$.

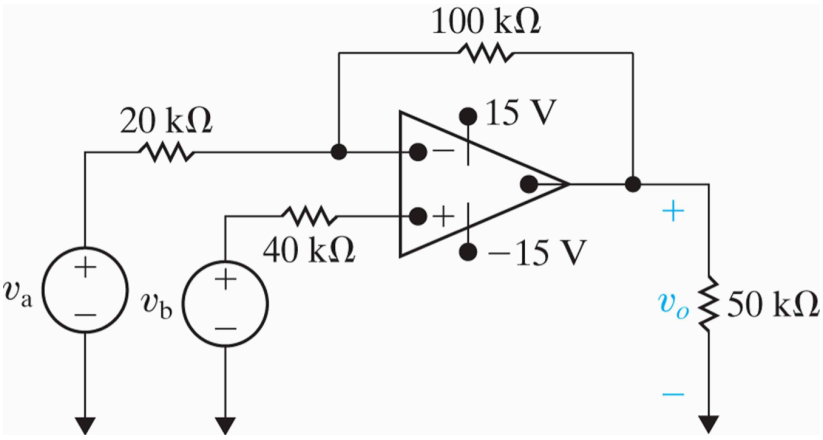
b) Calculate v_o if $v_a = 2\text{V}$ and $v_b = 0\text{V}$.

c) Calculate v_o if $v_a = 2\text{V}$ and $v_b = 1\text{V}$.

d) Calculate v_o if $v_a = 1\text{V}$ and $v_b = 2\text{V}$.

e) Calculate v_o if $v_a = 1.5\text{V}$ and $v_b = 4\text{V}$.

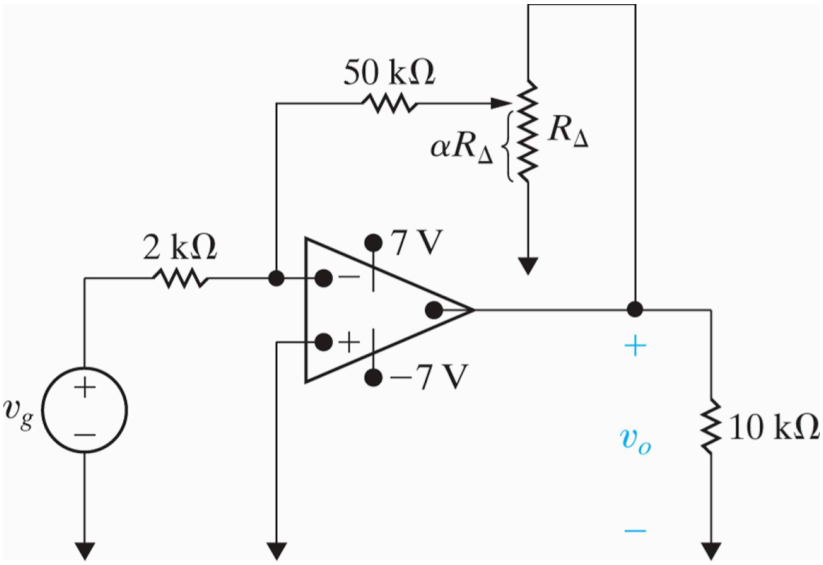
If $v_b = 1.6$ V, specify the range of v_a such that the amplifier does not saturate.



Problem #2

a) The op amp in the circuit shown is ideal. The adjustable resistor R_Δ has a maximum value of 100 kΩ, and α is restricted to the range of $0.2 < \alpha < 1$. Calculate the range of v_o if $v_g = 40$ mV.

b) If α is not restricted, at what value of α will the op amp saturate?



Problem #3

Design an inverting-summing amplifier so that

$v_O = -(3\ v_a + 5\ v_b + 4\ v_c + 2\ v_d)$.

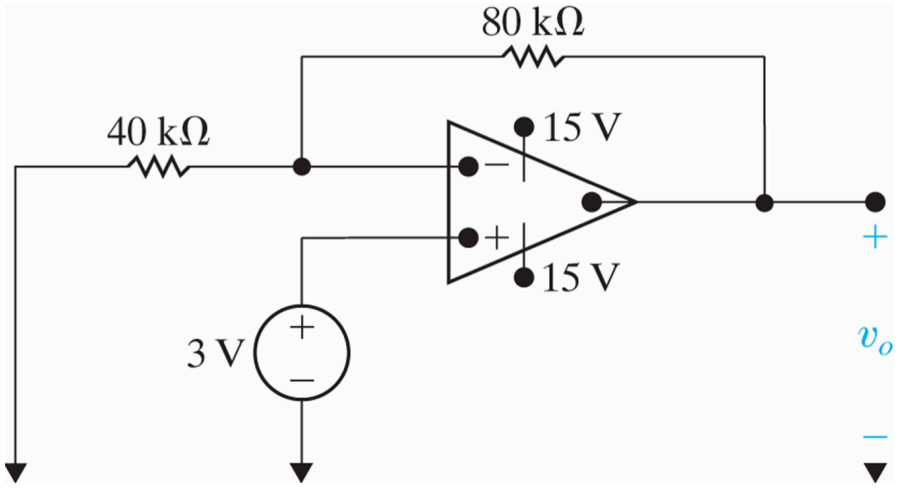
Start by choosing a feedback resistor (R_f) from Appendix H. Then choose single resistors from Appendix H or construct resistor networks from resistors in Appendix H to satisfy the design values for R_a, R_b, R_c, and R_d. Draw your final circuit diagram.

Problem #4

The op amp in the circuit is ideal.

a) What op amp circuit configuration is this?

b) Calculate v_o.



Problem #5

The op amp in the circuit is ideal. What value of R_f will give the equation $v_o = 5 - 4v_a$, for this circuit?