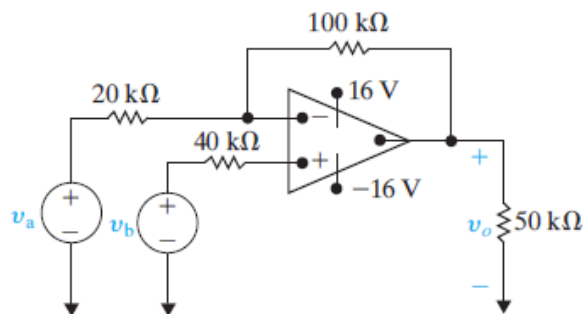


ENGR 065: Circuit Theory

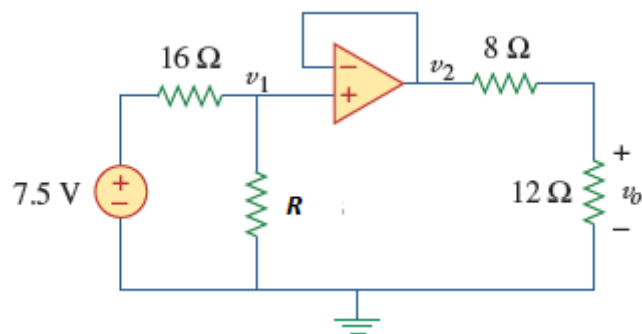
Problem Set #6

Read Chapter 5 from [1] and then solve the following problems.

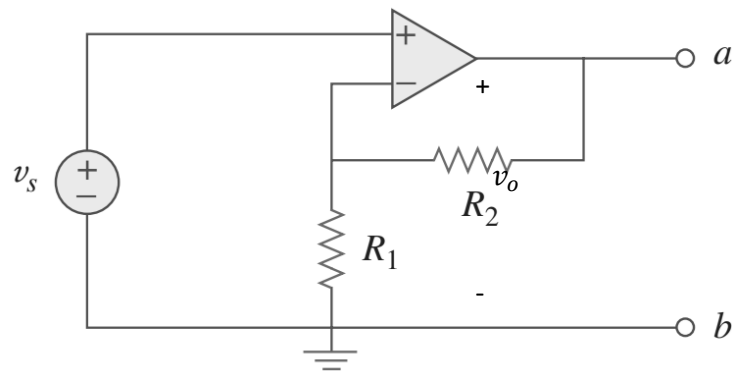
Problem 1 [20%]: Assuming an ideal OpAmp, compute v_o when $v_a = 1V$, $v_b = 0V$. Is the OpAmp operating in the linear region?



Problem 2 [20%]: Find v_o assuming an ideal OpAmp and $R = 29\Omega$.



Problem 3 [20%]: Select R_1 and R_2 such that $v_o = 6v_s$

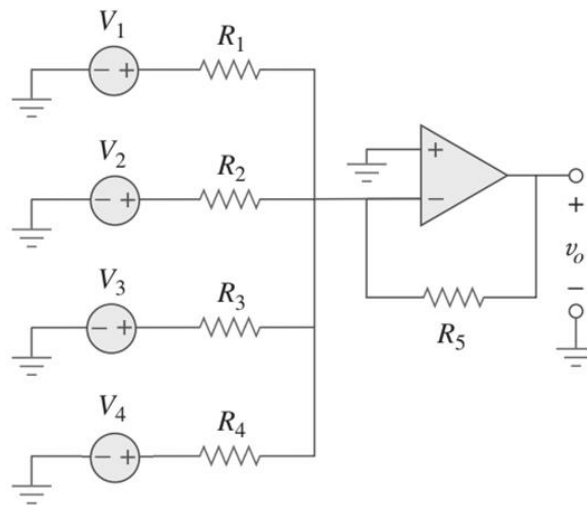


Problem 4 [30%]:

a) Determine v_o in terms of V_1, V_2, V_3, V_4 .

b) Design R_1, R_2, R_3, R_4, R_5 to obtain $v_o = -\frac{1}{4}(v_1 + v_2 + v_3 + v_4)$. This is known as an *averaging amplifier*, where the output equals to the (negative) average of the inputs.

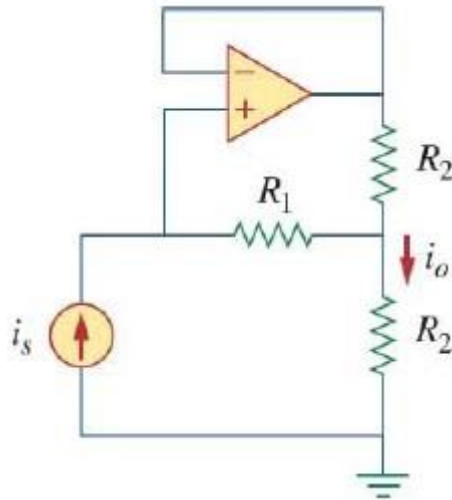
Hint: Fix $R_5 = 1k\Omega$ and pick the remaining resistors.



Problem 5 [10%]: A noninverting current amplifier is portrayed in the figure below.

a) Show that $i_o = K i_s$ where K is the current gain.

b) What is the value of K when $R_1 = 11k\Omega$ and $R_2 = 1k\Omega$.



References

[1] C. Alexander and M. Sadiku "Fundamentals of Electric Circuits", 7th Edition, 2021, McGraw-Hill