Assignment #1

#1-6 The design specifications for a simple inverting amplifier require an input resistance of 10 kΩ and a voltage gain, A = - 6.2

a) Prepare a design using an ideal OpAmp.

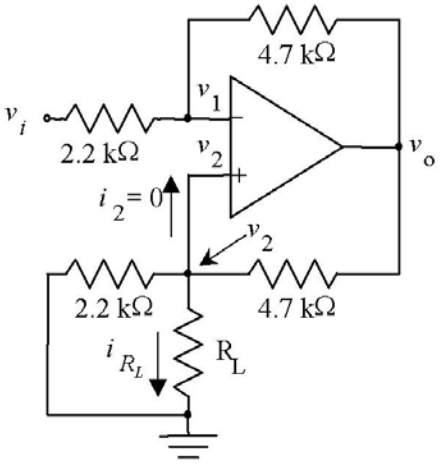
b) If a real OpAmp with the properties:

- R_i = 2 MΩ
- A = 200 k
- R_o = 75 Ω

is used, what error in the gain and input resistance will result due to the non-ideal properties of the OpAmp?

Solution: Will be included this week

#1-11. Determine the current through the load resistor, R_L, as a function of the input voltage, v_i, for the given circuit. Know that $v_2 = v_1$ and that $i_{RL} = v_2/R_L$.



Solution: Write node voltage equations at v_2 and v_1:

@ v_1 :

$$0 = \frac{v_1 - v_i}{2.2k} + \frac{v_1 - v_o}{4.7k}$$

@ $v2$:

$$0 = \frac{v_2 - 0}{2.2k \| R_L} + \frac{v_2 - v_o}{4.7k} = \frac{v_1}{2.2k \| R_L} + \frac{v_1 - v_o}{4.7k}$$, since $v_2 = v_1$

but (v_1 - v_o)/4.7k = (v_i - v_1)/2.2k = (v_i - v_2)/2.2k so:

$$0 = \frac{v_2}{2.2k \| R_L} + \frac{v_i - v_2}{2.2k}$$.

Note also that $i_{RL} = v_2 / R_L$.

Simplifying yields the solution:

$$iRL = \frac{v_2}{R_L} = -\frac{v_i}{2.2k}.$$

Confirmed using Pspice and v_i = 1V and R_L = 1k found in #1-11 Pspice folder. The result is the current through R_L.