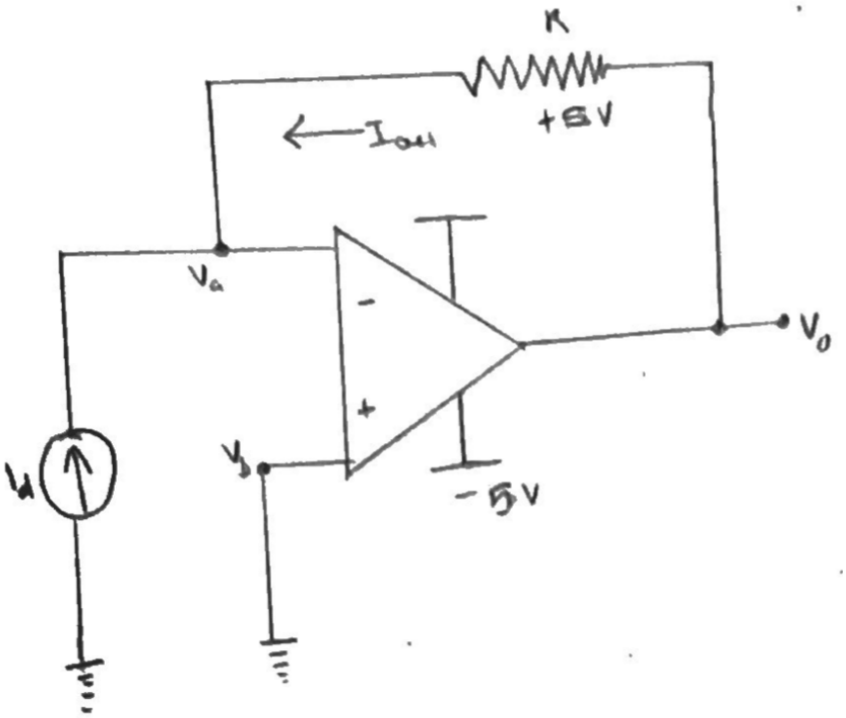
A. Analyze the circuit in Figure 4.4.
(a) Find *Vo* as a function of *R* and *Id* (assume the op-amp is ideal).



a) $I_d + I_{out} = 0$

$$I_d + \frac{V_o - V_a}{R} = 0$$

$V_a = V_b = 0$

$$I_d + \frac{V_o}{R} = 0$$

$$\frac{V_o}{R} = -I_d$$

$$\boxed{V_o = -I_d R (V)}$$

(b) If Id = 100μA and the desired Vo = -0.5V, find the proper value for R.

b) $-0.5 = 100\mu A\,(R)$

$R = 5000\Omega$

$\boxed{R = 5k\Omega}$

(c) Verify your result by running a SPICE/Multisim simulation using the 741 op-amp model. Be sure to display voltages on your schematic. (SPICE hint: Most students have found the "Universal Op-Amp" works best as your op-amp. Pay special attention to your pins as well as the directions of applied voltages. Use separate DC voltage sources which have been grounded for pin 7 and pin 4.)

DC OP 1

Signal	Value
PR1: V(4)	5.0000V