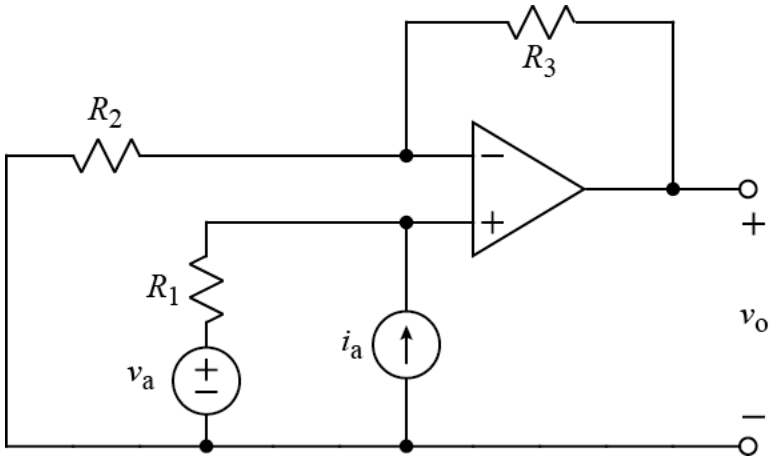
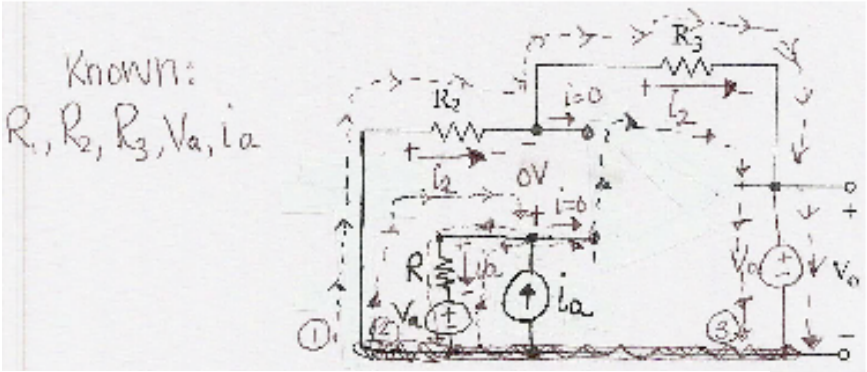
EX:



The op-amp operates in the linear mode. Using an appropriate model of the op-amp, derive an expression for v_o in terms of not more than v_a, i_a, R_1, R_2, and R_3.

SOL'N:



V-loop: ① $-i_2R_2 - i_2R_3 - V_o = 0$

② $-i_2R_2 - i_aR_1 - V_a = 0$

③ $+V_a + i_aR_1 - i_2R_3 - V_o = 0$

① $V_o = -i_2(R_2+R_3)$

② $i_2 = -\dfrac{(V_a + i_aR_1)}{R_2}$

plug ② into ①

$$V_o = \frac{(V_a + i_aR_1)}{R_2}(R_2+R_3) = \left(1+\frac{R_3}{R_2}\right)(V_a + i_aR_1)$$