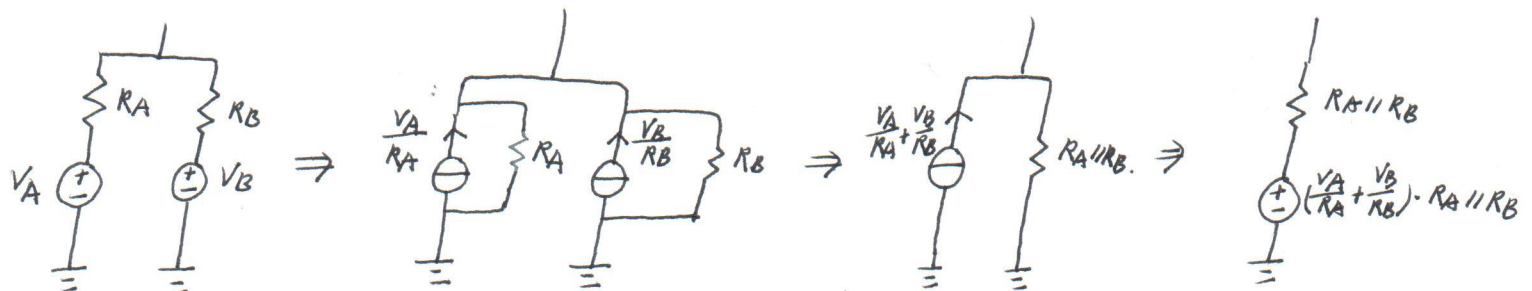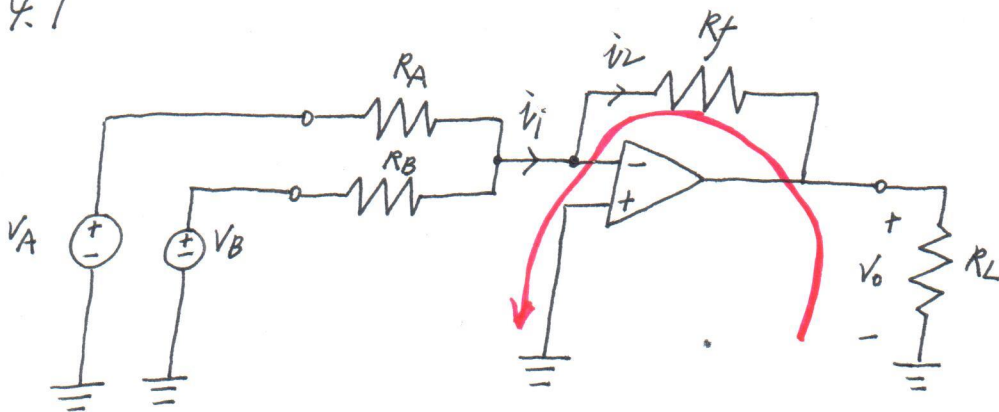# Chapter 4

4.1

(a) First, we verify that negative feedback is present.
According to the summing-point constraint:

$$i_1 = \left(\frac{V_A}{R_A} + \frac{V_B}{R_B}\right) \cdot R_A \| R_B \div (R_A \| R_B) = \frac{V_A}{R_A} + \frac{V_B}{R_B}$$

$$i_2 = i_1 = \frac{V_A}{R_A} + \frac{V_B}{R_B}$$

Writing a voltage equation around the loop that includes the output terminal, the resistor R_f, and op-amp input terminal:

$$V_0 + i_2 R_f = 0$$

$$\therefore \quad V_0 + \left(\frac{V_A}{R_A} + \frac{V_B}{R_B}\right) R_f = 0$$

$$V_0 = -\left(\frac{R_f}{R_A}\right) V_A - \left(\frac{R_f}{R_B}\right) V_B$$

(b) The input resistance for V_A is equal to R_A.

(c) The input resistance for V_B is equal to R_B.

(d) The output resistance is zero.