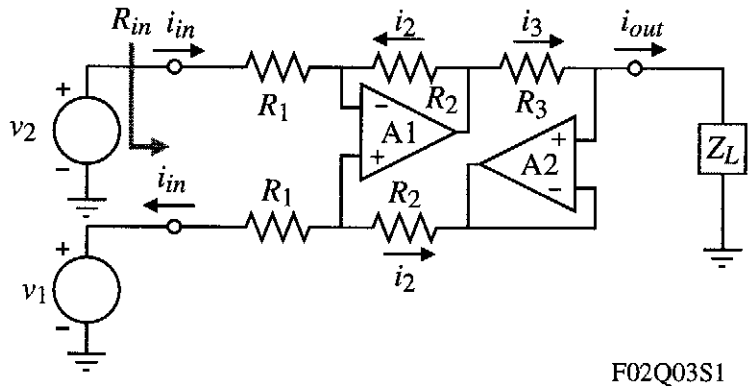
QUIZ NO. 3 - SOLUTION

(Average Score = 6.2/10)

Assume that the op amps are ideal and find i_{out} as a function of the inputs, v_1 and v_2. Find the input resistance defined as $R_{in} = (v_2 - v_1)/i_{in}$.



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Solution

From the circuit we can write the following equations based on an ideal op amp:

$$i_{out} = i_3, \qquad v_2 - v_1 = 2R_1 i_{in}, \qquad i_2 R_2 + i_2 R_2 = i_3 R_3, \qquad i_{in} = -i_2$$

$$\therefore \quad i_{out} = i_3 = \frac{2R_2 i_2}{R_3} = \frac{2R_2}{R_3}(-i_{in}) = \frac{2R_2}{R_3}\left(-\frac{v_2 - v_1}{2R_1}\right) = \frac{R_2}{R_1 R_3}(v_1 - v_2)$$

$$\boxed{i_{out} = \frac{R_2}{R_1 R_3}(v_1 - v_2)}$$

The input resistance, R_{in} is seen to be equal to $2R_1$. $\boxed{R_{in} = 2R_1}$