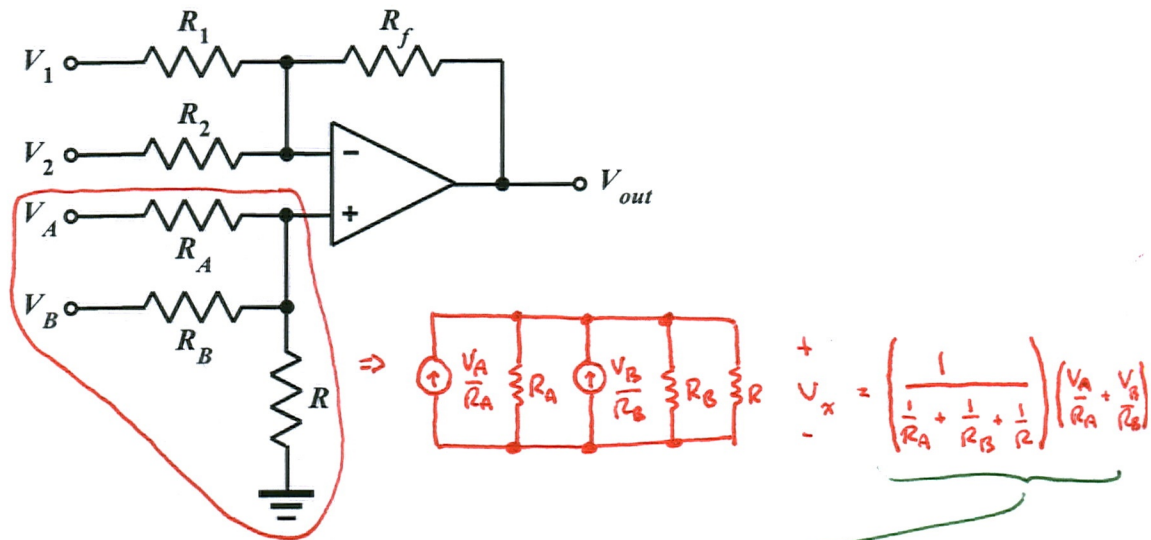


Homework Problem #02

For the circuit shown below, determine a relationship of the form

$$V_{out} = K_1 V_1 + K_2 V_2 + K_A V_A + K_B V_B$$

i.e., find K_1 , K_2 , K_A , and K_B in terms of the resistor values in the circuit. Assume the op amp is ideal.



From Homework Problem #01:

$$\begin{aligned} V_{out} &= -\frac{R_f}{R_1} V_1 - \frac{R_f}{R_2} V_2 + \left[1 + R_f \left(\frac{1}{R_1} + \frac{1}{R_2} \right) \right] V_x \\ &= -\frac{R_f}{R_1} V_1 - \frac{R_f}{R_2} V_2 + \left[1 + R_f \left(\frac{1}{R_1} + \frac{1}{R_2} \right) \right] \left(\frac{1}{\frac{1}{R_A} + \frac{1}{R_B} + \frac{1}{R}} \right) \left(\frac{V_A}{R_A} + \frac{V_B}{R_B} \right) \end{aligned}$$

$$K_1 = -\frac{R_f}{R_1}$$

$$K_2 = -\frac{R_f}{R_2}$$

$$K_A = \frac{1 + R_f \left(\frac{1}{R_1} + \frac{1}{R_2} \right)}{1 + R_A \left(\frac{1}{R_B} + \frac{1}{R} \right)}$$

$$K_B = \frac{1 + R_f \left(\frac{1}{R_1} + \frac{1}{R_2} \right)}{1 + R_B \left(\frac{1}{R_A} + \frac{1}{R} \right)}$$