

Problem 6.4-12

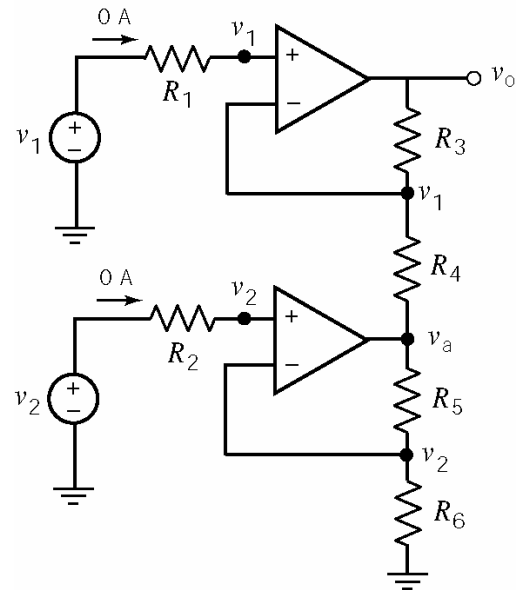
Node equations:

$$\frac{v_a - v_2}{R_5} = \frac{v_2}{R_6} \Rightarrow v_a = \left(\frac{R_5 + R_6}{R_6} \right) v_2$$

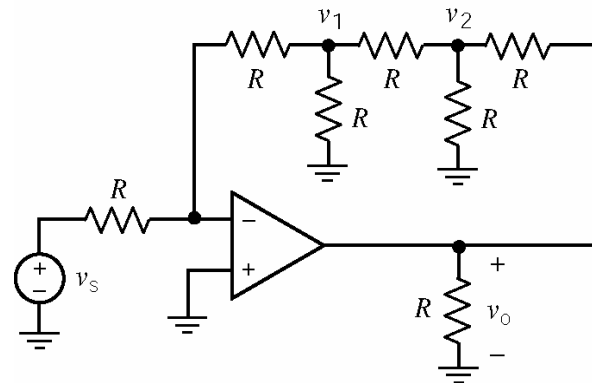
$$\frac{v_o - v_1}{R_3} = \frac{v_1 - v_a}{R_4} \Rightarrow v_o = \left(1 + \frac{R_3}{R_4} \right) v_1 - \left(\frac{R_3}{R_4} \right) v_a$$

Substituting for v_a gives

$$v_o = \left(1 + \frac{R_3}{R_4} \right) v_1 - \left(\frac{R_3}{R_4} \right) \left(\frac{R_5 + R_6}{R_6} \right) v_2$$



Problem 6.4-15



Writing node equations:

$$\frac{v_s}{R} + \frac{v_1}{R} = 0 \Rightarrow v_1 = -v_s$$

$$\frac{v_1}{R} + \frac{v_1}{R} + \frac{v_1 - v_2}{R} = 0 \Rightarrow v_2 = 3v_1 = -3v_s$$

$$\frac{v_2 - v_1}{R} + \frac{v_2}{R} + \frac{v_2 - v_o}{R} = 0 \Rightarrow v_o = 3v_2 - v_1 = -8v_s$$