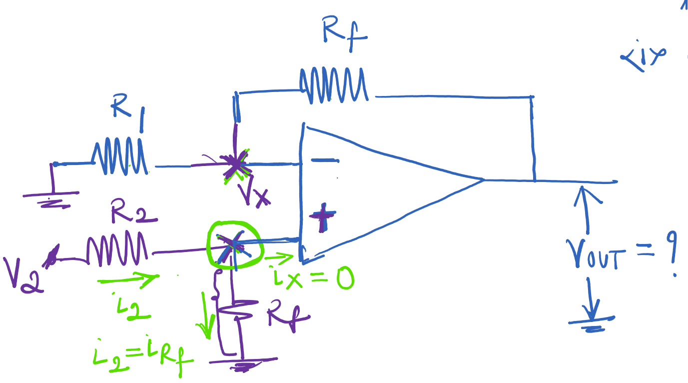


SUBTRACTOR

* Superposition theorem.

(i) CASE-1; feeding input 'V_1', $V_2 = 0$.

$$V_{0_1} = -\frac{R_f}{R_1} V_1$$

(ii) CASE-2; feeding input 'V_2', $V_1 = 0$.

$$i_2 = \frac{V_2 - 0}{R_2 + R_f}$$

$$V_x = i_2 R_f = \frac{V_2 \cdot R_f}{R_2 + R_f}$$

MAHE-MIT-00 at 06-06-2021 12:10

$$V_{0_2} = \left(1 + \frac{R_f}{R_1}\right) V_x$$

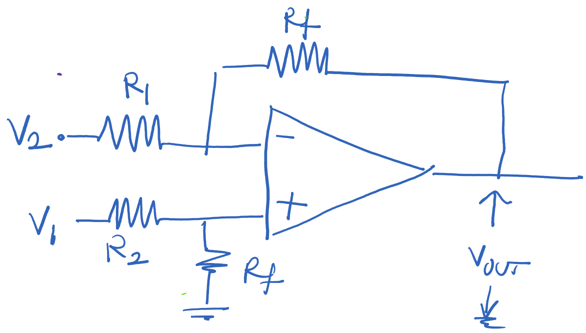
$$V_{OUT} = V_{0_1} + V_{0_2}$$

$$\boxed{V_{OUT} = -\frac{R_f}{R_1} V_1 + \left(1 + \frac{R_f}{R_1}\right)\left(\frac{V_2 R_f}{R_2 + R_f}\right)}$$

If $R_1 = R_2$: $V_{OUT} = -\frac{R_f}{R_1} V_1 + \left(\frac{\cancel{R_1 + R_f}}{R_1}\right)\left(\frac{V_2 R_f}{\cancel{R_1 + R_f}}\right) = \frac{R_f}{R_1}(V_2 - V_1)$

If $R_f = R_1$: $V_{OUT} = V_2 - V_1$

realize $V_0 = V_1 - 0.5 V_2$; $\frac{R_f}{R_1}$



$$V_{OUT} = -\frac{R_f}{R_1} V_2 + \left(1 + \frac{R_f}{R_1}\right)\left(\frac{R_f}{R_2 + R_f}\right) V_1$$

$$\frac{R_f}{R_1} = 0.5$$

$$\boxed{R_1 = \frac{R_f}{0.5}}$$

$$\left(1 + \frac{R_f}{R_1}\right)\left(\frac{R_f}{R_2 + R_f}\right) = 1$$

$$(1 + 0.5)\left(\frac{R_f}{R_2 + R_f}\right) = 1$$

$$\frac{R_f}{R_2 + R_f} = \frac{1}{1.5} = 0.67$$

$$\boxed{R_2 = 0.5 R_f}$$