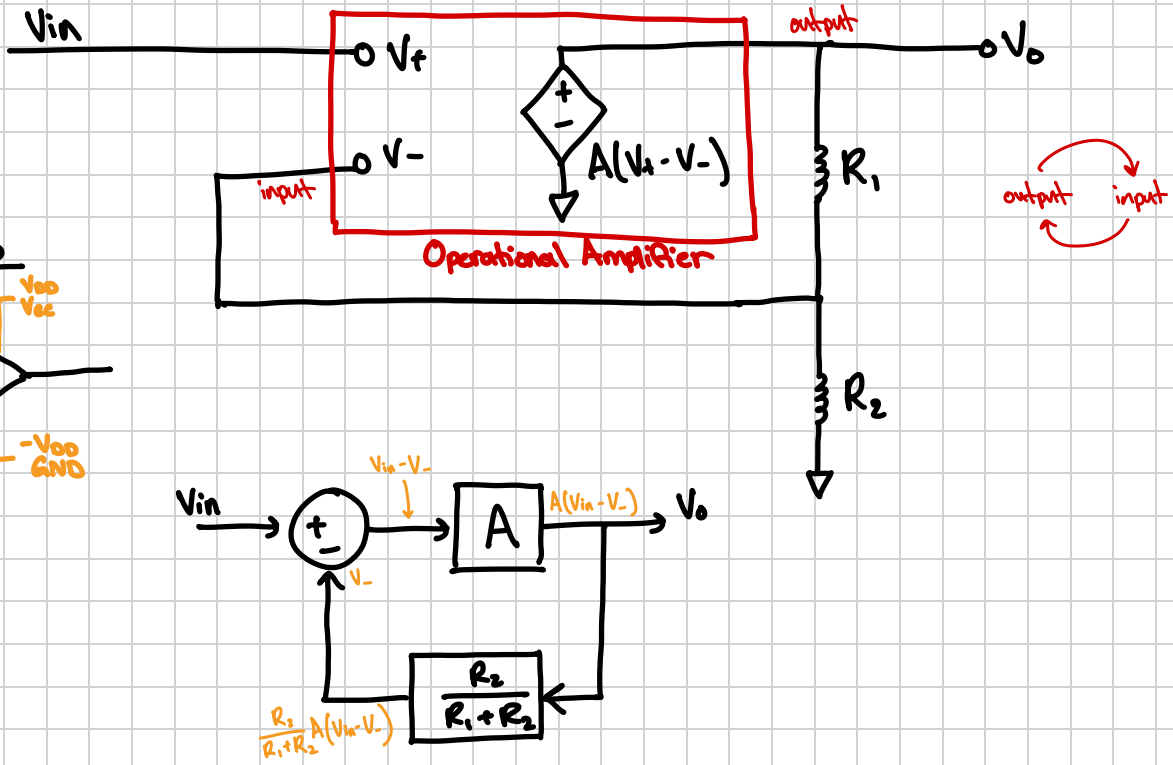
# FEEDBACK




$$V_o = A(V_+ - V_-)$$

$$V_o = A\left(V_{in} - \underbrace{\frac{R_2}{R_1+R_2} V_o}_{\text{Feedback}}\right)$$

$$\left(1 + A\frac{R_2}{R_1+R_2}\right) V_o = A V_{in}$$

$$\boxed{V_o = \frac{\overbrace{A}^{\text{Gain}}}{1 + A\frac{R_2}{R_1+R_2}} V_{in}} \approx \frac{R_1+R_2}{R_2} V_{in}$$

★ No new tools yet

Let $A \to \infty$

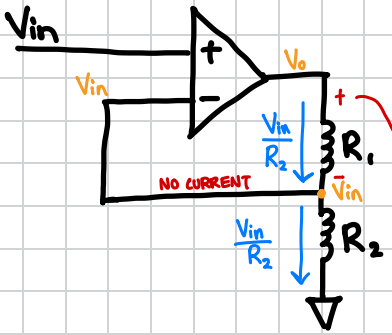
Let $A >> \frac{R_1+R_2}{R_2}$

$$\boxed{V_- \to V_{in} = V_+}$$

## Golden Rule of Negative Feedback

1) if negative feedback
2) if $A \to \infty$
3) if stable

$\Rightarrow V_+ - V_- = 0$ $\boxed{V_- = V_+}$

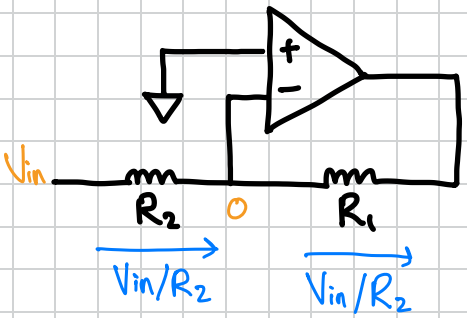



$V_{R_1} = R_1 \times \frac{Vin}{R_2}$

$V_o = V_{R_2} + V_{R_1}$

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

Gain




$V_o = 0 - Vin \frac{R_1}{R_2}$

$\boxed{V_o = -\frac{R_1}{R_2} Vin}$

Inverting Amplifier