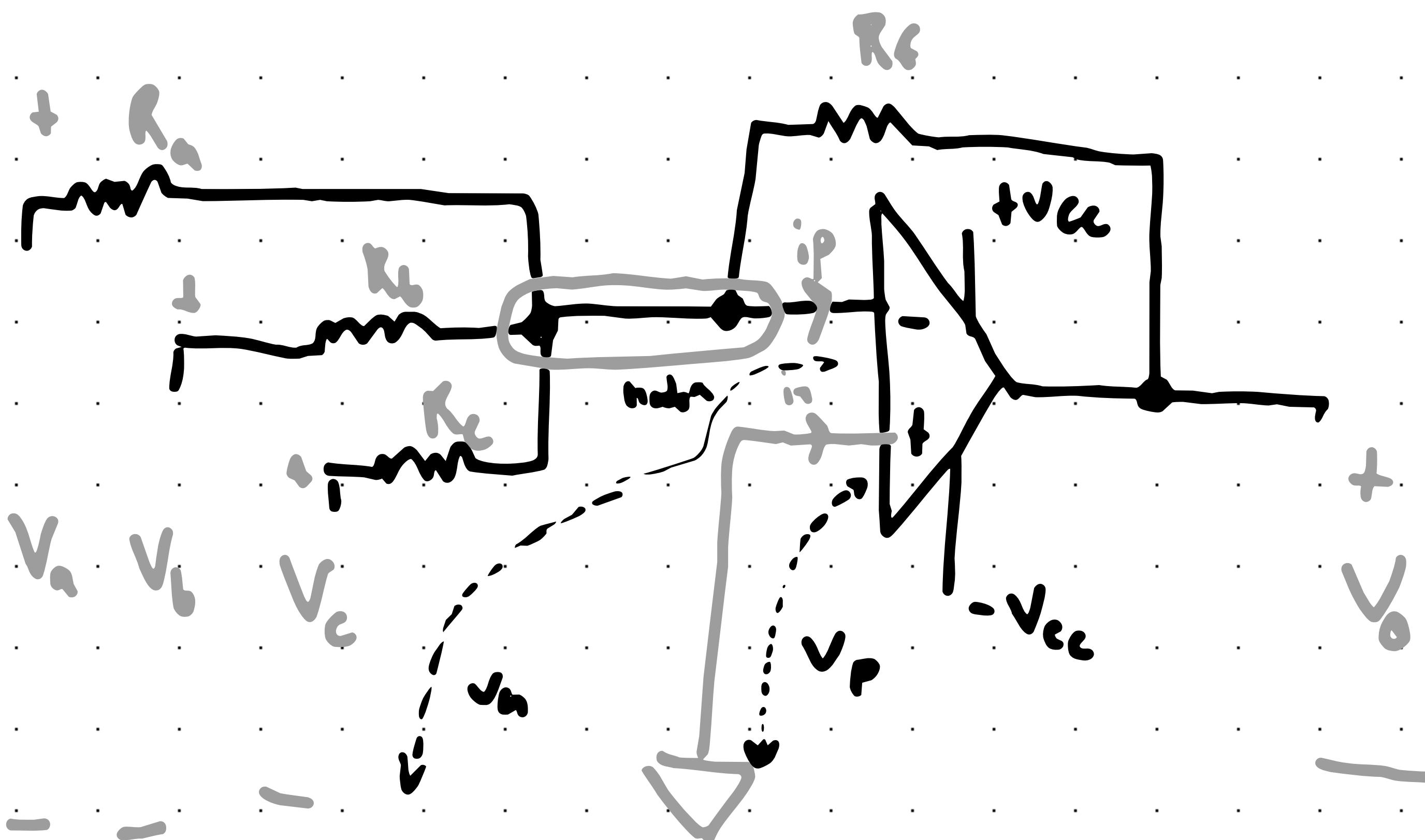
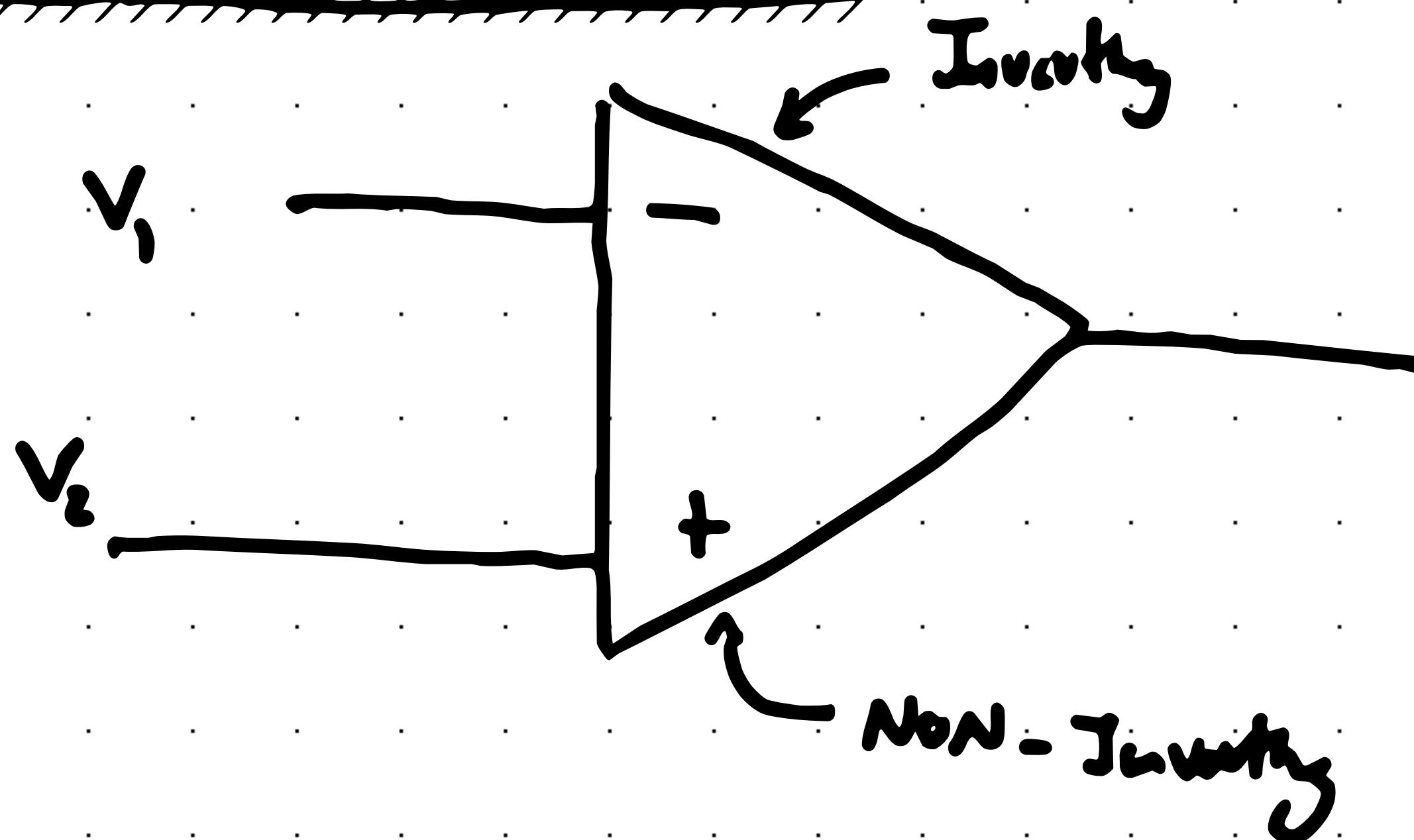


The Schematic of an Op-Amp Circuit



$$I_p = I_n = 0, \quad V_p = V_n$$

$$\sum_{I=0} V_I = \frac{V_I - V_A}{R_A} + \frac{V_I - V_B}{R_B} + \frac{V_I - V_C}{R_C} + \frac{V_I - V_O}{R_F}$$

$$t_{in} = 0$$

$$V_O = - \left[\frac{R_F}{R_A} V_A + \frac{R_F}{R_B} V_B + \frac{R_F}{R_C} V_C \right]$$

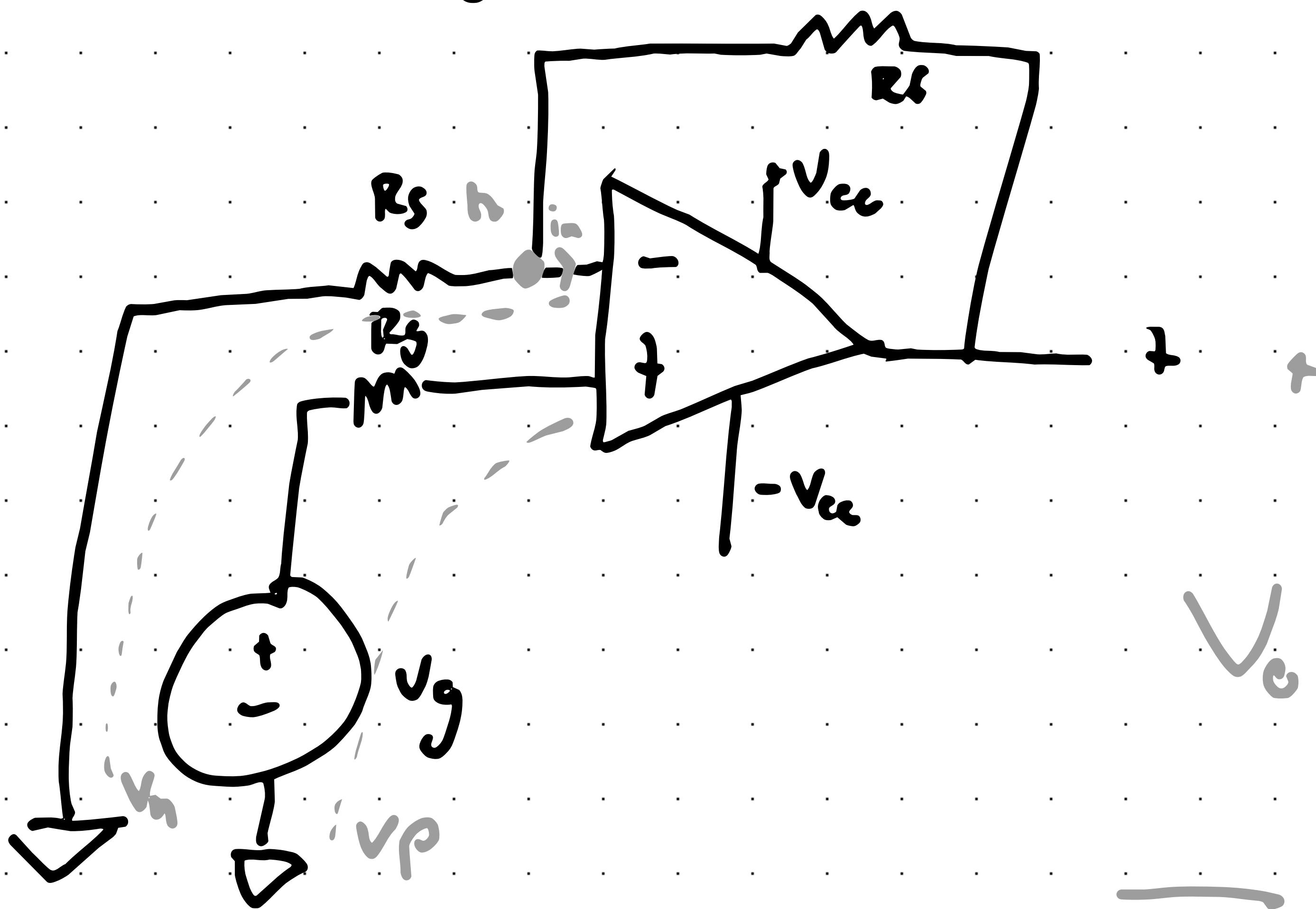
If $R_A = R_B = R_C = R_S$

$$V_O = - \left[\frac{R_F}{R_S} V_A + \frac{R_F}{R_S} V_B + \frac{R_F}{R_S} V_C \right]$$

$$V_O = - \left[\frac{R_F}{R_S} (V_A + V_B + V_C) \right]$$

Summing Inverting OPAMP

NON-Inverting Amplifier Circuit



$$I_P = I_N = 0$$

$$V_u = V_P$$

Since $V_P = V_g$, Then

$$V_u = V_g$$

$$\sum I = 0$$

at node n

$$\frac{V_g}{R_S} + \frac{V_u - V_C}{R_F} + i_n = 0$$

$$\frac{V_g}{R_S} + \frac{V_u}{R_F} = 0$$

$$\frac{V_g}{R_s} + \frac{V_g}{R_C} - \underbrace{\frac{V_o}{R_f}}_{\rightarrow} = 0$$

$$\frac{V_o}{R_f} = V_g \left[\frac{1}{R_s} + \frac{1}{R_f} \right]$$

$$V_o = V_g \left[\frac{R_f}{R_s} + \frac{R_f}{R_f} \right]$$

$$V_o = V_g \left[\frac{R_f}{R_s} + 1 \right]$$

$$V_o = V_g \left[\frac{R_f + R_s}{R_s} \right]$$

NON-Inverting

Op-Amp

