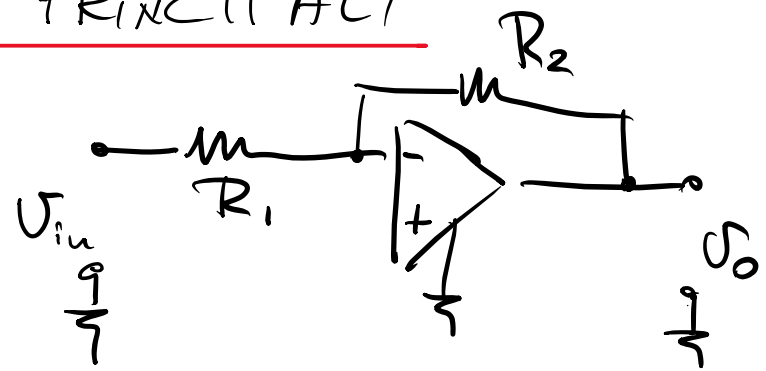
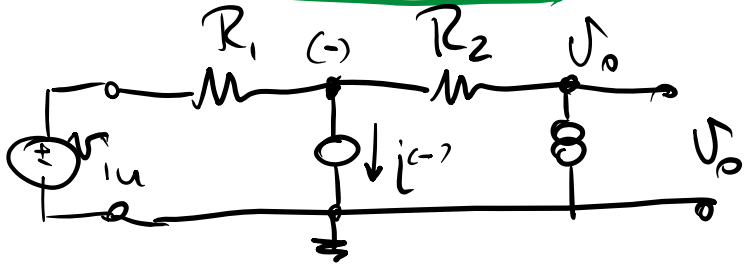
AMPLIFIC. OPERAZIONALE — CONFIG. PRINCIPALI

CONFIG. AMPLIFICATORE INVERTENTE



Con modello ideale:

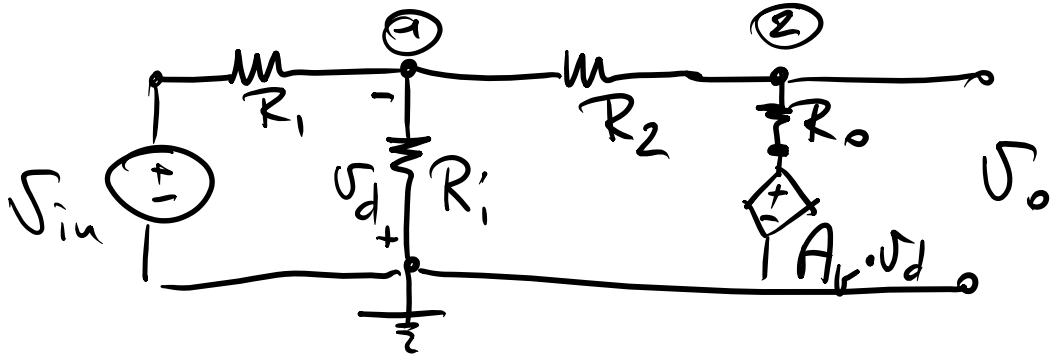


$$\left(\frac{1}{R_1}+\frac{1}{R_2}\right)v^{(-)} - \frac{1}{R_2}v_o + i^{(-)} = \frac{1}{R_1}v_{in} \qquad \text{eq. nodo } (-)$$

$v^{(-)} = 0$ $\qquad$ $i^{(-)} = 0$

$$\Rightarrow \quad \boxed{v_o = -\frac{R_2}{R_1}v_{in}}$$

CON MODELLO REALE



① $\left(\frac{1}{R_1} + \frac{1}{R_i} + \frac{1}{R_2}\right) v_1 - \frac{1}{R_2} v_2 = \frac{1}{R_1} v_{in}$

② $-\frac{1}{R_2} v_1 + \left(\frac{1}{R_2} + \frac{1}{R_o}\right) v_2 - \frac{1}{R_o}\left(A_v \cdot v_d\right) = 0$

③ $v_d = -v_1$

RISOLVO RISPETTO A $v_2 \equiv v_o$

$$\Rightarrow v_o = \frac{-R_i R_2 A_v + R_i R_o}{R_1 R_i (1 + A_v) + R_i R_o + R_1 R_o + R_i R_2 + R_1 R_2} v_{in} = \xrightarrow{\text{tog. tog.}}$$

dividendo per $A_v R_i$

$$= \frac{-R_2 + R_o/A_v}{\left(R_1 \frac{1+A_v}{A_v} + \frac{R_o}{A_v} + \frac{R_1 R_o}{A_v R_i} + \frac{R_2}{A_v} + \frac{R_1 R_2}{A_v R_i} \right)} V_{in}$$

$= Den$

$$V_d = \frac{(R_2 + R_o)/A_v}{Den}$$

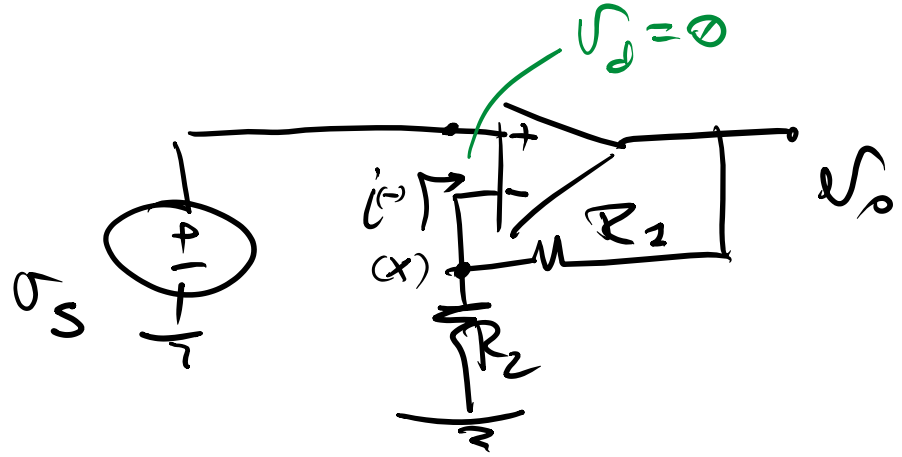
$$\hookrightarrow \lim V_o = -\frac{R_2}{R_1} V_{in} \qquad \lim V_d = 0$$

$A_v \to \infty$
$R_i \to \infty$
$R_o \to 0$

$A_v \to \infty$
$R_i \to \infty$
$R_o \to 0$

□

CONFIG. AMPLIFIC. NON INVERTENTE



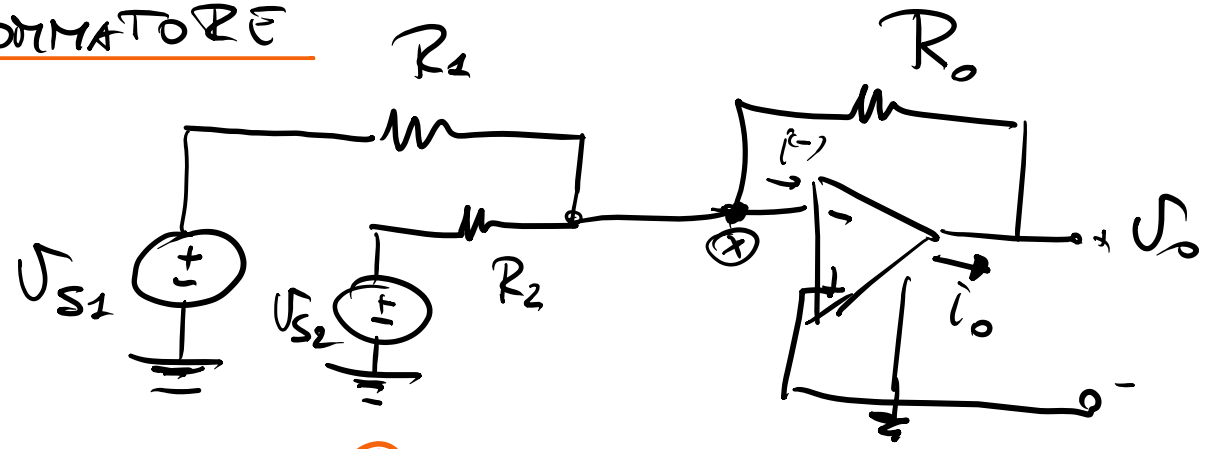
(x) $\left(\frac{1}{R} + \frac{1}{R_2}\right) v_x - \frac{1}{R_1} v_o + i^{(-)} = 0$ ($i^{(-)} = 0$)

$\Downarrow$

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

eq. $v_x = v_s$

AO in configurat. SOMMATORE (INVERTENTE)



⊗ $\left(\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_0}\right) v_x - \frac{1}{R_0} v_o + i^{(-)} = \frac{1}{R_1} v_{s1} + \frac{1}{R_2} v_{s2}$

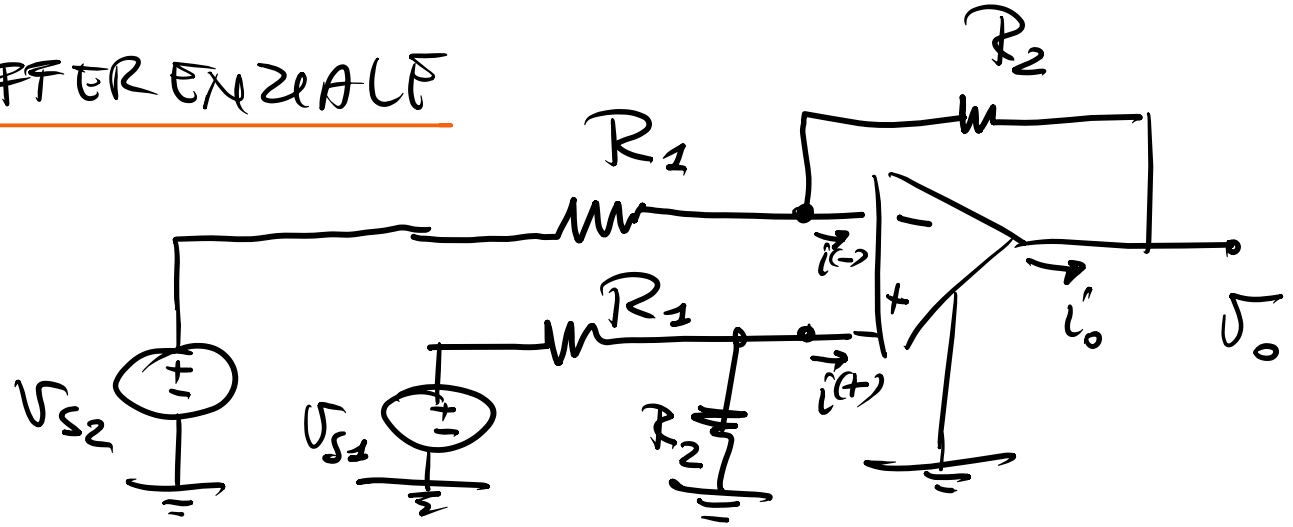
HP $R_1 = R_2 = R_3$

$\Rightarrow \quad v_o = -\frac{R_0}{R_1} v_{s1} - \frac{R_0}{R_2} v_{s2} = -\frac{R_0}{R_3}\left(v_{s1} + v_{s2}\right)$ □

event. eq. ulteriore nodo out AO

$\frac{1}{R_0}(v_o - v_x) - i_o = 0 \Rightarrow i_o = \frac{v_o}{R_0}$

AO in config. DIFFERENZIALE



(-) $\left(\frac{1}{R_1}+\frac{1}{R_2}\right)v^{(-)} - \frac{1}{R_2}v_0 + \cancel{i^{(-)}}^{\,0} = \frac{1}{R_1}v_{S2}$

(+) $\left(\frac{1}{R_1}+\frac{1}{R_2}\right)v^{(+)} + \cancel{i^{(+)}}^{\,0} = \frac{1}{R_1}v_{S1}$

eq.) $v^{(+)} - v^{(-)} = 0$

$$\Rightarrow \boxed{v_0 = \frac{R_2}{R_1}\left(v_{S1} - v_{S2}\right)}$$

eq. nodo uscita $\quad \frac{1}{R_2}\left(v_0 - v^{(-)}\right) - i_0 = 0 \quad \Rightarrow \quad i_0 = \frac{v_{S1}R_2 - v_{S2}(R_1+R_2)}{R_1(R_1+R_2)}$