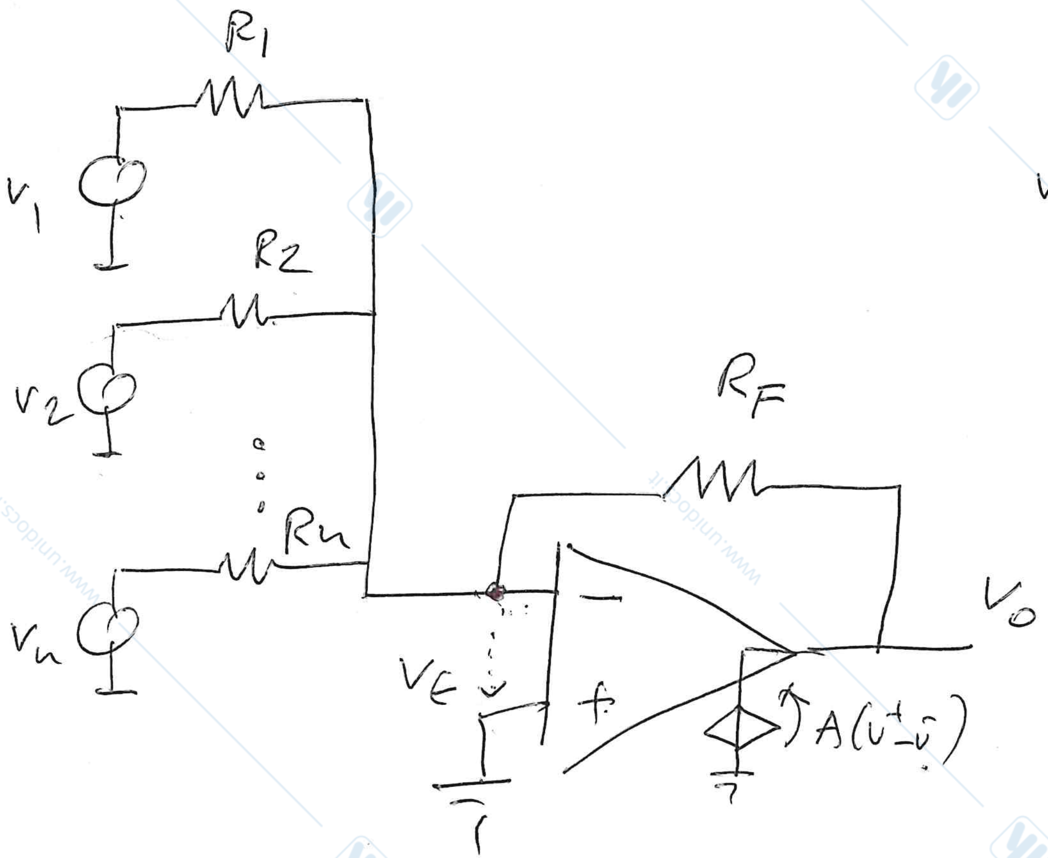
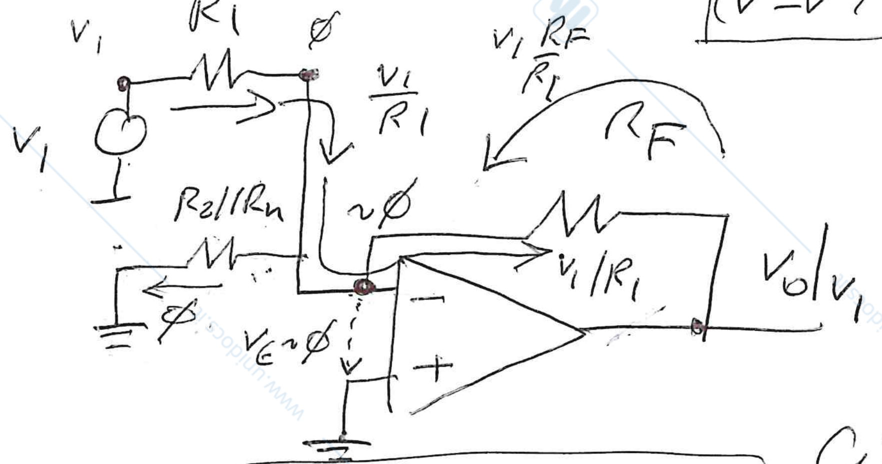
AMPLIFICATORE SOMMATORE



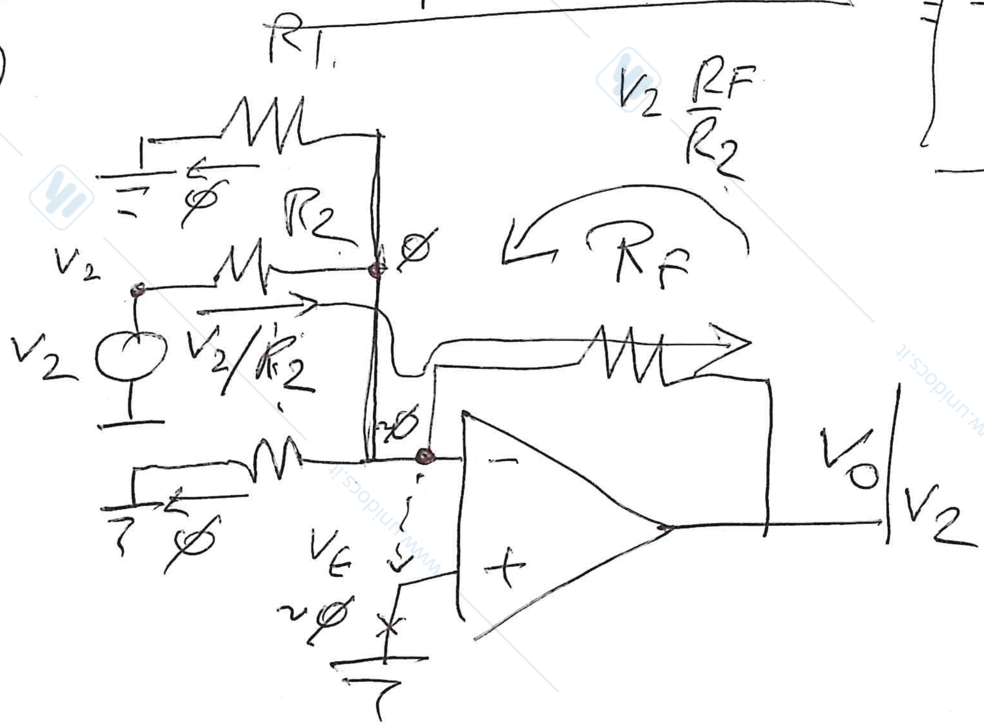
$$G_{ID} = \frac{V_o|_{V_2}}{V_2} = -\frac{R_F}{R_2}$$

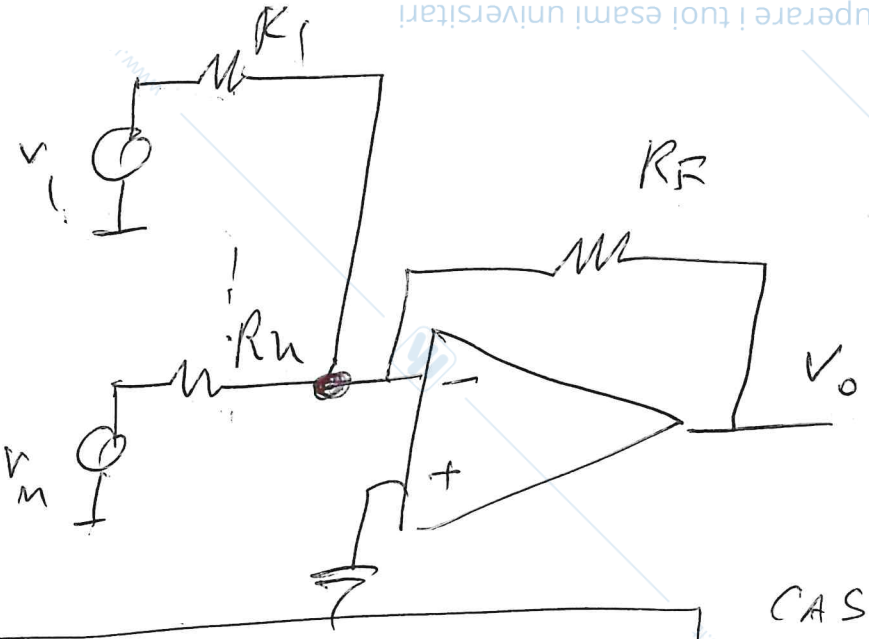
$$\Rightarrow V_o|_{V_2} = -V_2 \frac{R_F}{R_2}$$

Guadagno ideale $(A \to \infty)$ $(v^+ - v^-) \to 0$



$$\Rightarrow V_o|_{v_1} = -V_1 \frac{R_F}{R_1} \rightarrow G_{ID} = \frac{V_o|_{V_1}}{V_1} = -\frac{R_F}{R_1}$$





SOVRAPPOSIZIONE DEGLI EFFETTI

$$V_O\Big|_{id} = (-)\, V_1 \frac{R_F}{R_1} - V_2 \frac{R_F}{R_2} \dots - V_n \frac{R_F}{R_n} =$$

$$= -R_F \left[\frac{V_1}{R_1} + \frac{V_2}{R_2} + \dots + \frac{V_n}{R_n} \right] =$$

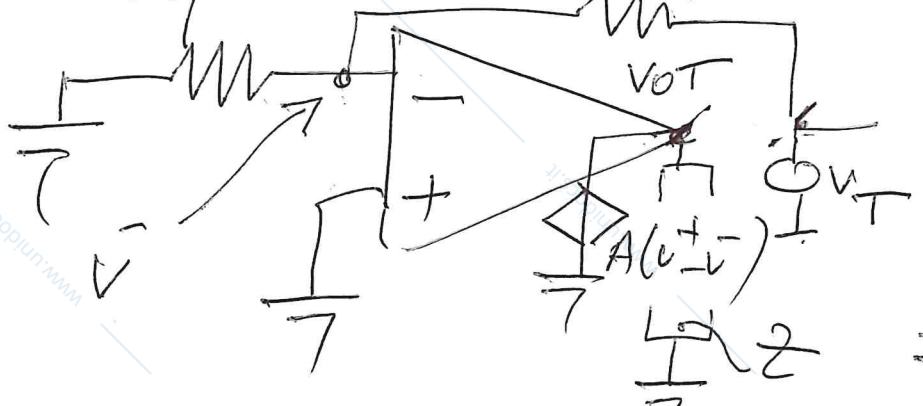
CASO PARTICOLARE $R_1 = R_2 = \dots = R_n = R$:

$$V_O\Big|_{id} = -\frac{R_F}{R} (V_1 + V_2 + \dots + V_n)$$

$$G_R = G_{ID} \left[\frac{-G_L}{1 - G_L} \right]$$

GUADAGNO D'ANELLO (G_{loop}) – uguale a tutte le FdT!

$R_{eq} = R_1 \| R_2 \| \dots \| R_n$

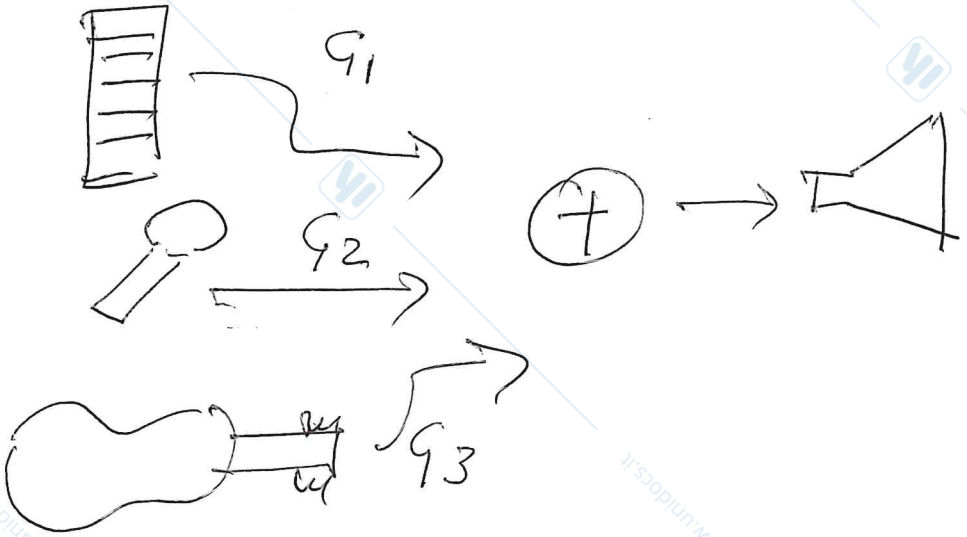


$$V^- = V_T \frac{R_{eq}}{R_{eq} + R_F}$$

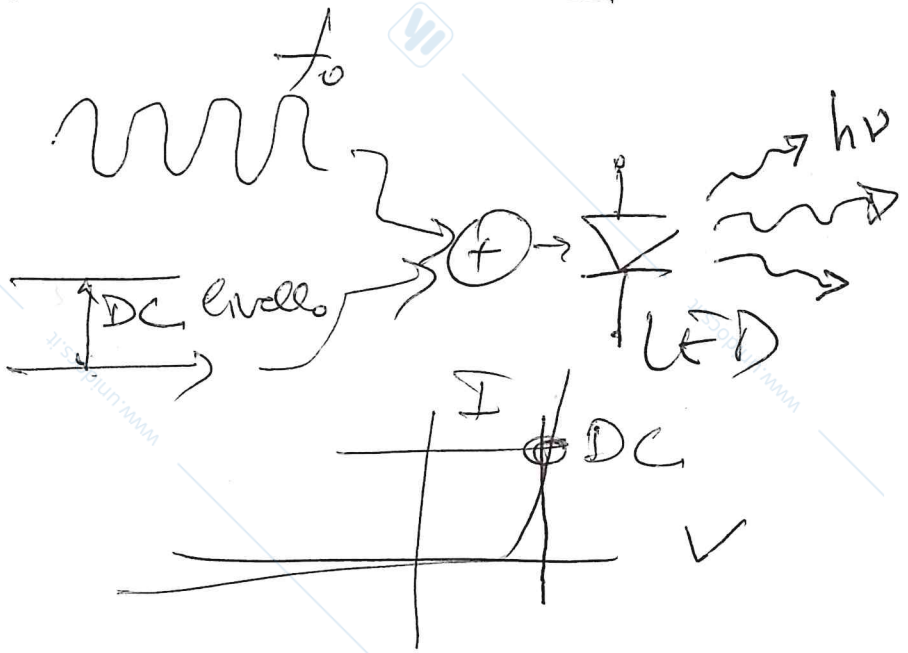
$$V_{OT} = \left(-A \frac{R_{eq}}{R_{eq} + R_F} \right) V_T$$

$$\Rightarrow G_{loop} \triangleq \frac{V_{OT}}{V_T} = -A \frac{R_{eq}}{R_{eq} + R_F}$$

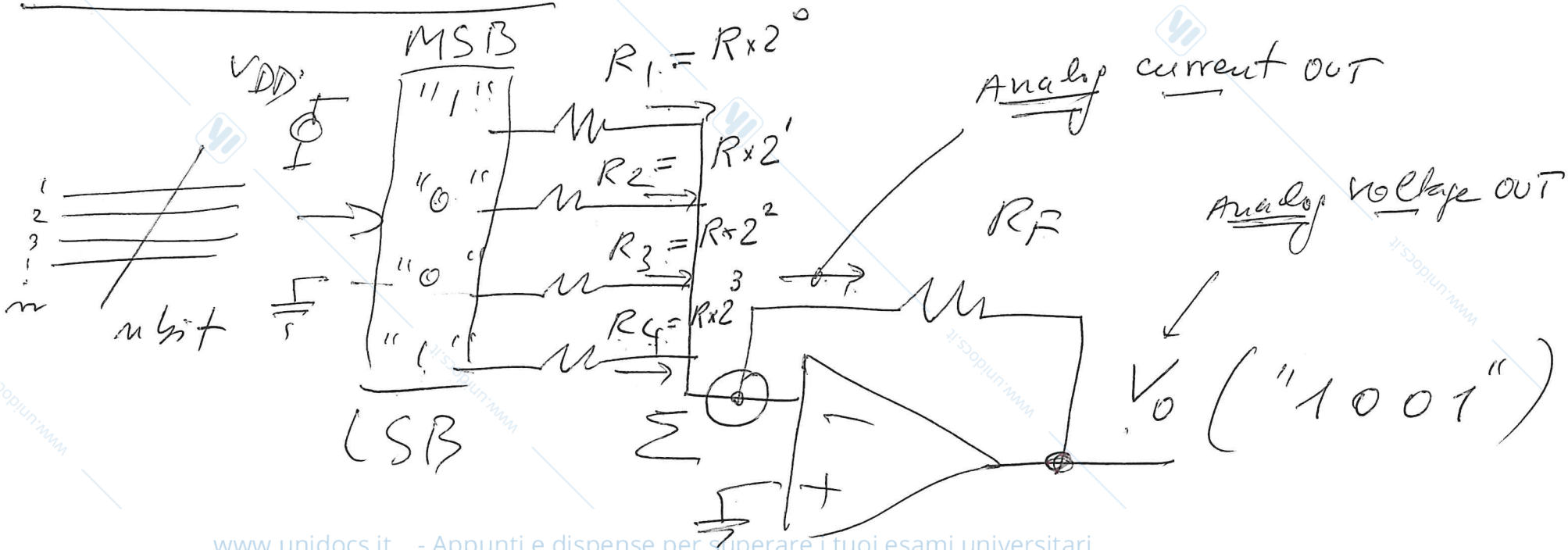
#1) MIXER AUDIO/VIDEO



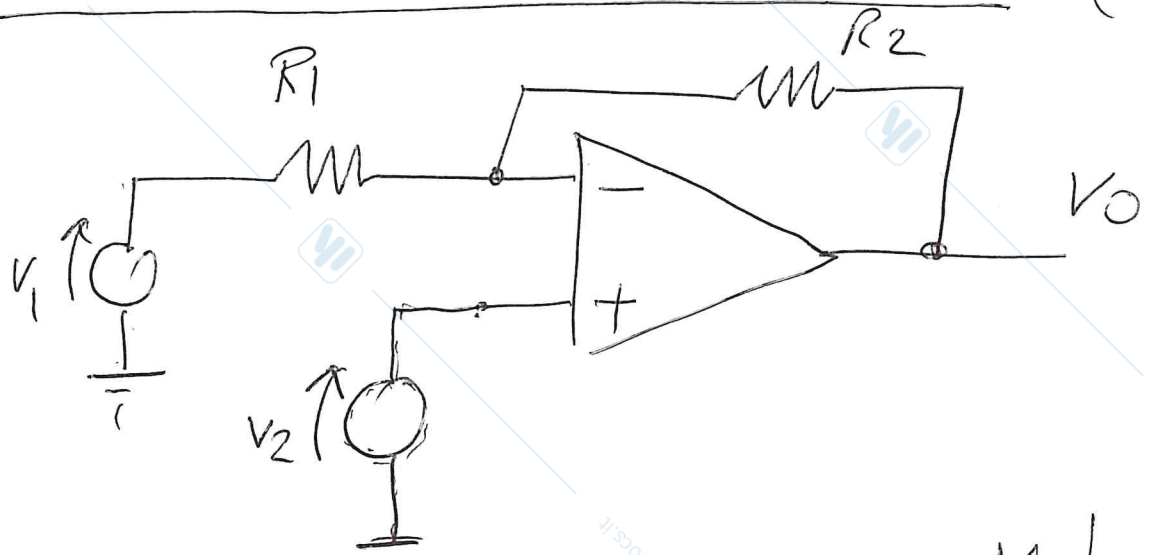
#2) AC + DC



#3) D/A CONVERTER



AMPLIFICATORE SOTTRATTORE ("DELLE DIFFERENZE")



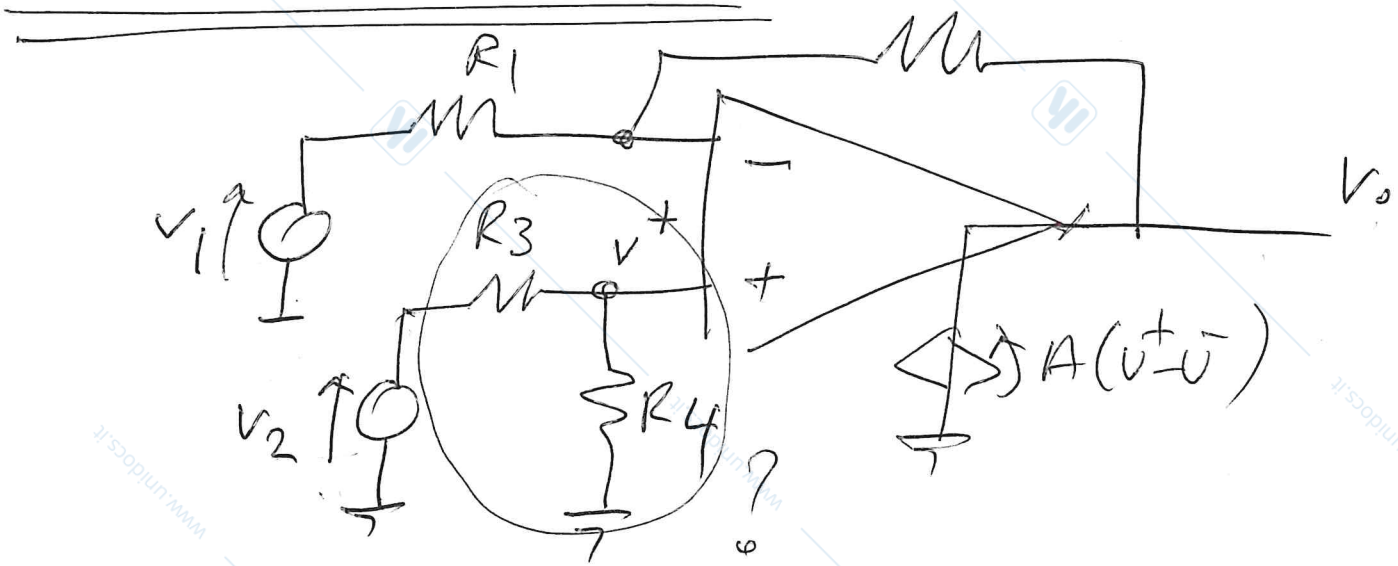
$$V_0 = \left(-\frac{R_2}{R_1}\right) \cdot V_1$$

$$V_0 = \left(1 + \frac{R_2}{R_1}\right) \cdot V_2$$

$$\rightarrow V_0 = \left(-\frac{R_2}{R_1}\right) V_1 + \left(1 + \frac{R_2}{R_1}\right) \cdot V_2$$

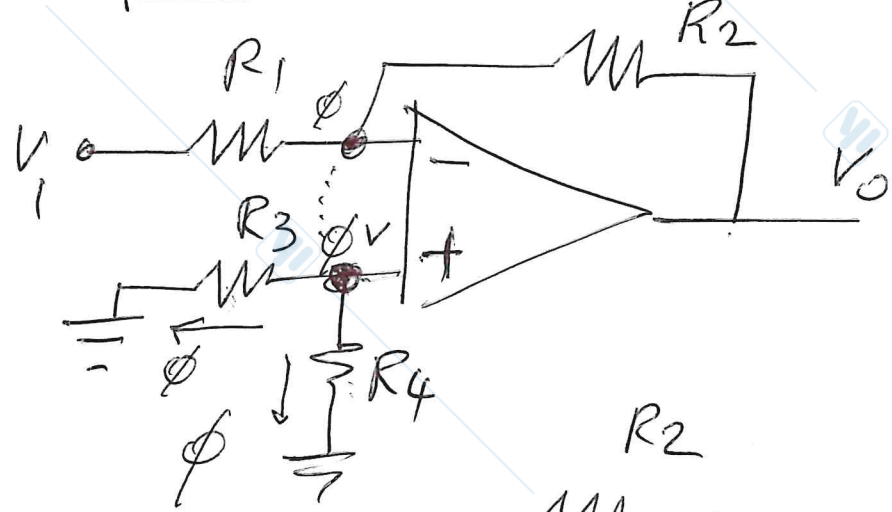
$V_0 \overset{?}{=} \cdot (V_1 - V_2)$?

R_2



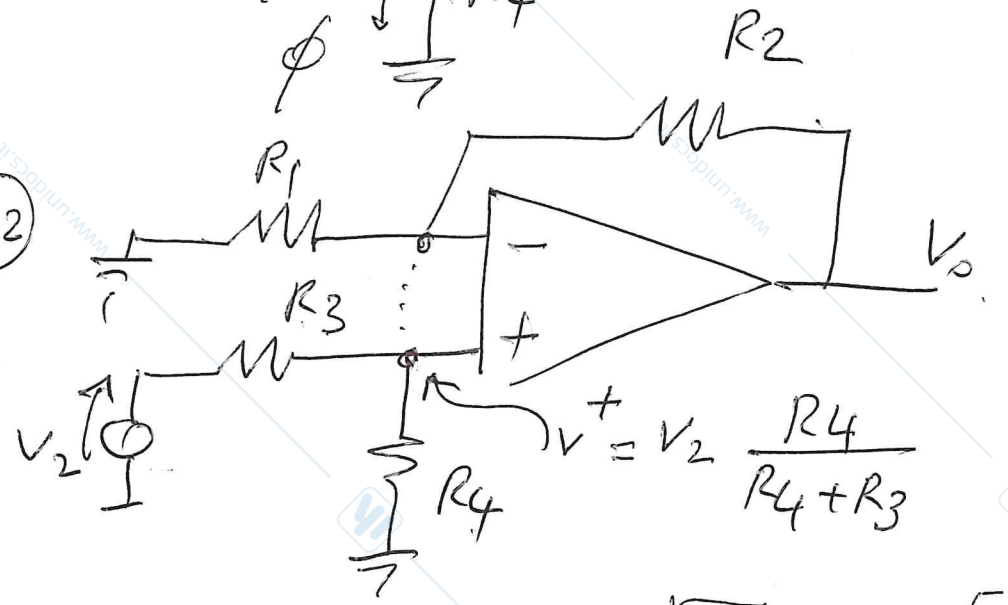
Sovrapposizione effetti (GID)

(V1)



$$\rightarrow V_0|_{V_1} = \left(-\frac{R_2}{R_1}\right) \cdot V_1 \quad \left(\frac{\text{Config.}}{\text{INV.}}\right)$$

(V2)



$$v^+ = V_2 \frac{R_4}{R_4+R_3}$$

$$\rightarrow V_0|_{V_2} = \overbrace{V_2\left(\frac{R_4}{R_4+R_3}\right)}^{v^+} \cdot \left(1+\frac{R_2}{R_1}\right)$$

(Conf. NoN.INV.)

(V1) + (V2) $\Rightarrow$

$$V_0 = -\underbrace{\left[\frac{R_2}{R_1}\right]}_{G_1} \cdot V_1 + \underbrace{\left[\frac{R_4}{R_3+R_4}\cdot\left(1+\frac{R_2}{R_1}\right)\right]}_{G_2} \cdot V_2 = \boxed{-G_1 V_1} + \boxed{G_2 V_2}$$

Se $\dfrac{R_2}{R_1} = \dfrac{R_4}{R_3+R_4}\left(1+\dfrac{R_2}{R_1}\right) \rightarrow G_1 = G_2 = G \Rightarrow \boxed{V_0 = G(V_2 - V_1)}$

$$\frac{R_2}{R_1} = \frac{R_4 /\!/ R_3}{R_3 + R_4 /\!/ R_3}\left(1 + \frac{R_2}{R_1}\right)$$

$\frac{R_2}{R_1}$ → caso stato

$R_4 /\!/ R_3$ → caso nullo

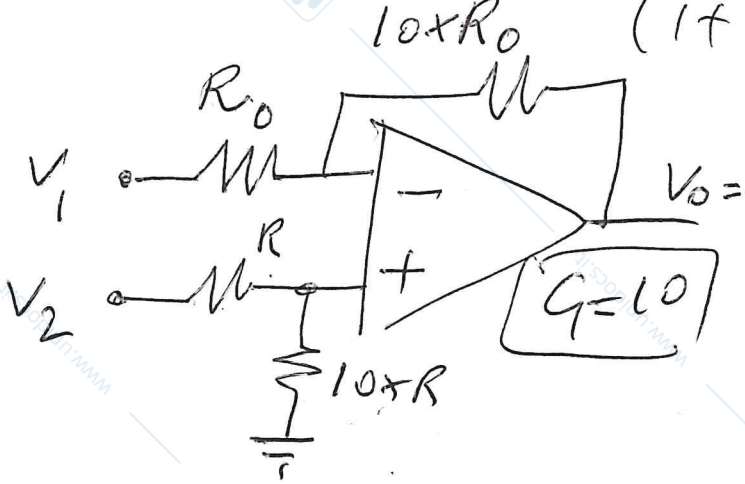
CONDIZIONE PER AVERE

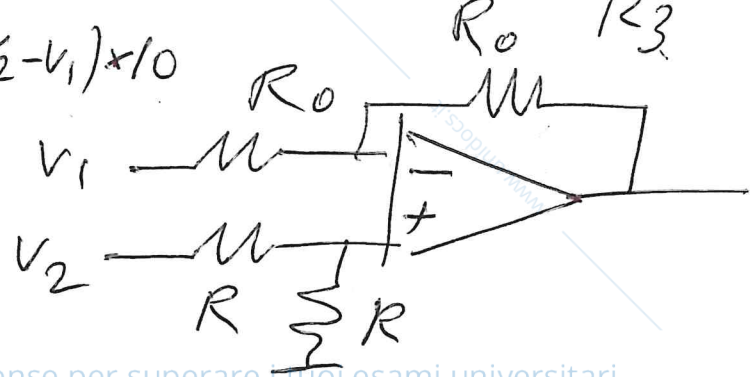
$$V_0 = G(V_2 - V_1)$$

$$\begin{cases} K_1 = \dfrac{R_2}{R_1} \\ K_2 = \dfrac{R_4}{R_3} \end{cases} \Rightarrow K_1 = \frac{K_2}{1+K_2}(1+K_1)$$

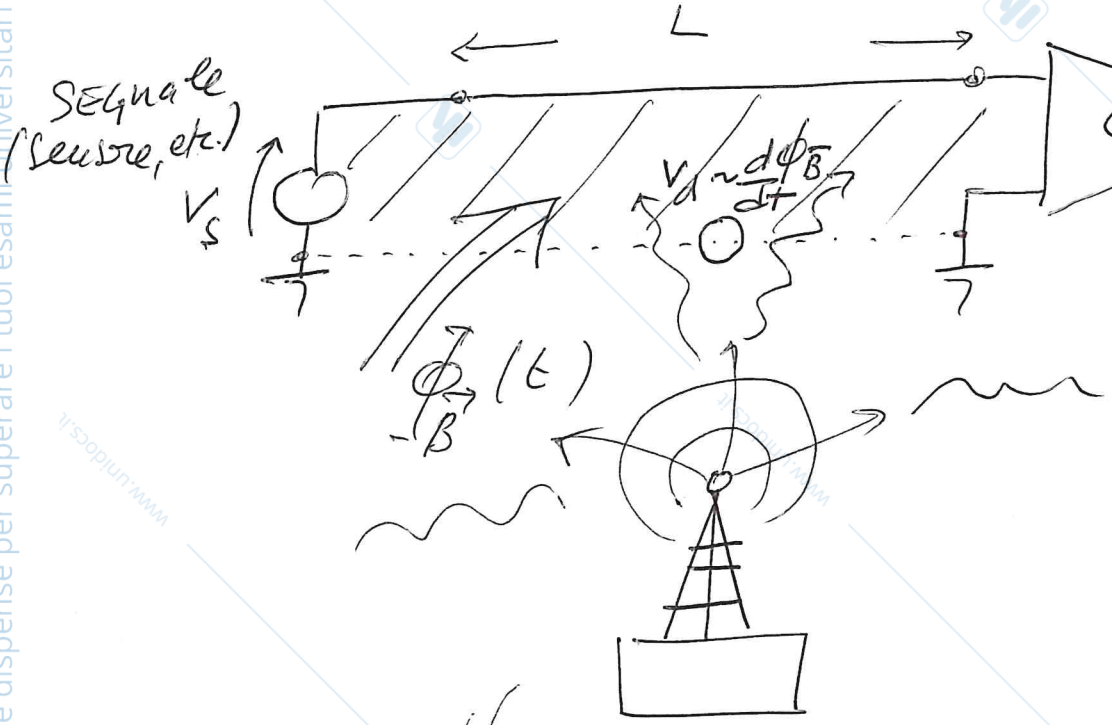
$$\frac{K_1}{(1+K_1)} = \frac{K_2}{1+K_2} \Rightarrow \boxed{K_1 = K_2} \quad !$$

$$\frac{R_4}{R_3} = \frac{R_2}{R_1} = G$$



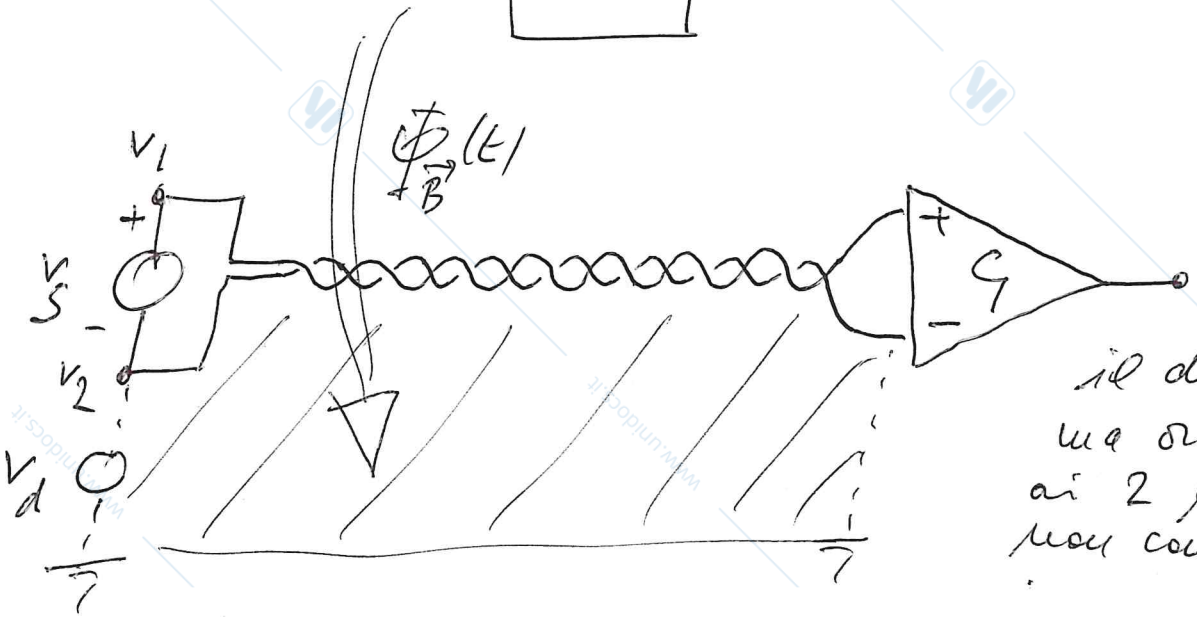


CANCELLAZIONE DISTURBI E.M. CON "LETTURA DIFFERENZIALE"



$V_o = G(V_s + V_d)$

↑ disturbo dovuto ad accoppiamento del flusso del campo e.m. con la maglia di ingresso.



$= V_d + V_s$ $\quad$ $= V_d$

$V_o = G(V_1 - V_2) = G V_s$

il disturbo V_d non viene eliminato, ma ora compare come termine "comune" ai 2 ingressi differenziali e quindi non contribuisce (idealmente) a V_o.