

DAC - VUOTO

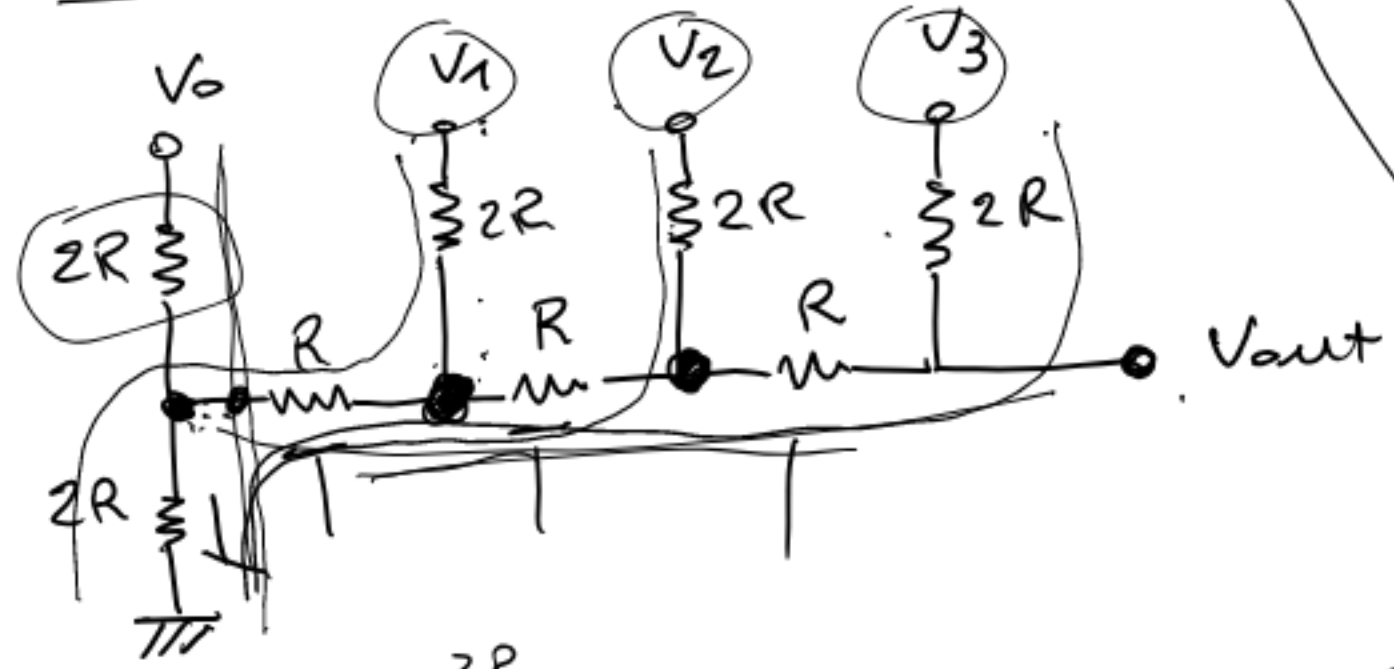
DAC

$$V_{out} = \frac{V_0}{16} + \frac{V_1}{8} + \frac{V_2}{4} + \frac{V_3}{2}$$

$$V_i = \begin{cases} 0 & [\text{GND}] \\ 1 & [16V] \end{cases}$$

$$\Rightarrow V_{out} = \begin{cases} 15V \\ 0V \end{cases}$$

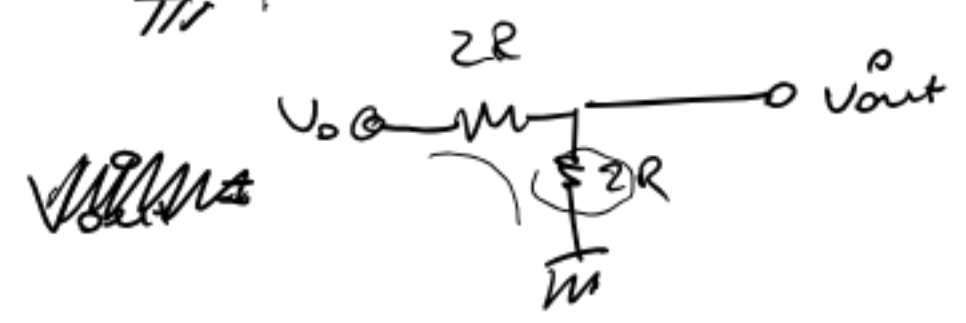
$\Delta V = 1V$



DAC, VUOTO

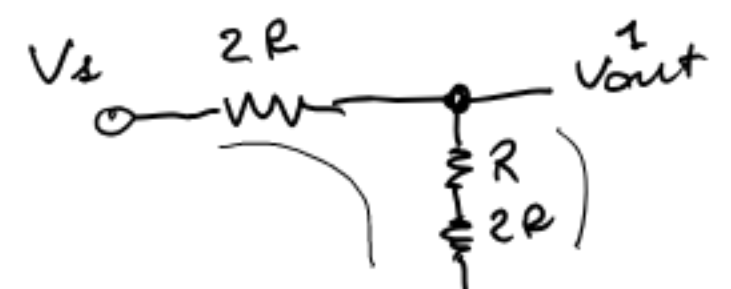
$$V_i = \begin{cases} 1 & [100V] \\ \text{OPEN} \end{cases}$$

$V_{1,2,3}$ scollejati



$$V_{out}^0 = \frac{2R}{24R} V_0 = \frac{V_0}{12}$$

$V_{0,2,3}$ open



$$V_{out}^1 = \frac{3R}{5R} V_1 = \frac{3}{5} V_1 = 0.6 V_1$$

$V_{0,1,3}$ open



$$V_{out}^2 = \frac{4R}{6R} V_2 = \frac{2}{3} V_2 = 0.667 V_2$$

$V_{0,1,2}$ open



$$V_{out}^3 = \frac{5R}{7R} V_3 = \frac{5}{7} V_3 = 0.714 V_3$$

$$V_{out} = \frac{V_0}{2} + 0,6 \cdot V_1 + 0,667 V_2 + 0,714 V_3$$

$V_i = 100 V$

	V_0	V_1	V_2	V_3	V_{out}
	→				50 V
		→			60 V
			→		66,7 V
				→	71,4 V

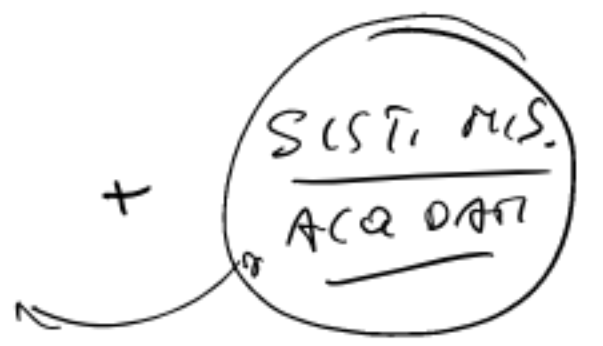
OK

~~$0,5 + 0,6 = 1,1$~~ 110 V

V_0, V_1, V_i, V_j ? ? ?

AMPLIFICATORI

DIG + ANALOG. → EL GENERAZIONE
DIG + AN
I SEM

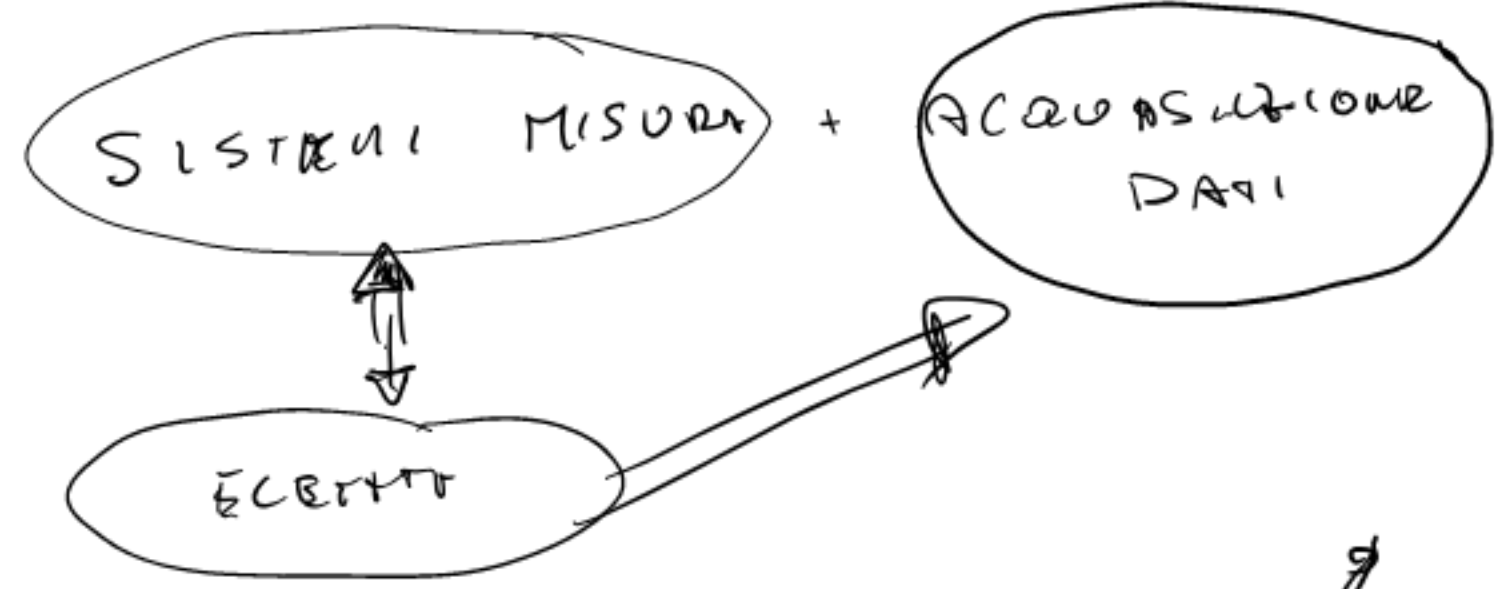


Software

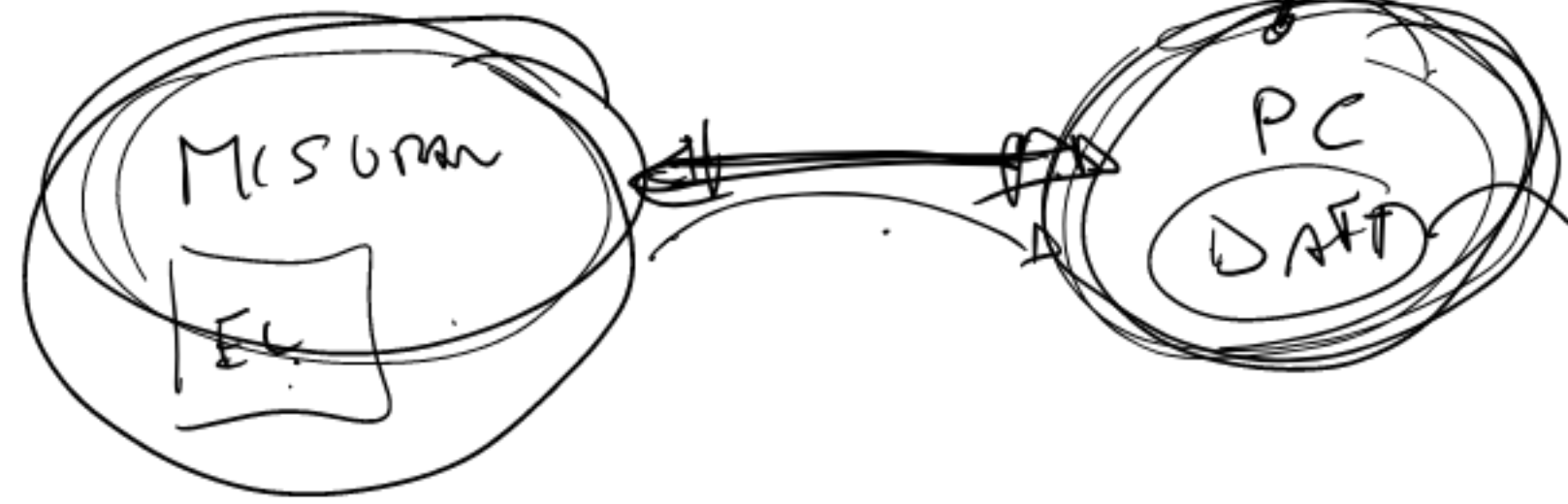
- interfaccia hardware
- Algoritmi
elaborazione
visualizzazione

GOOD / BAD

Analisi

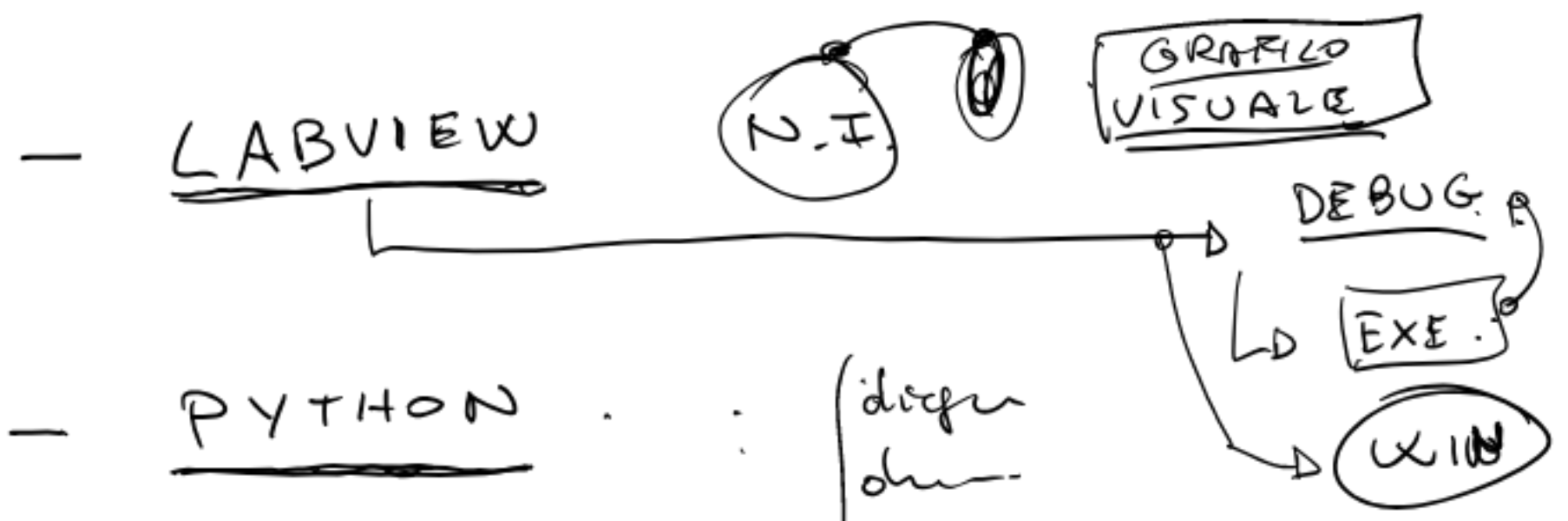


LAB



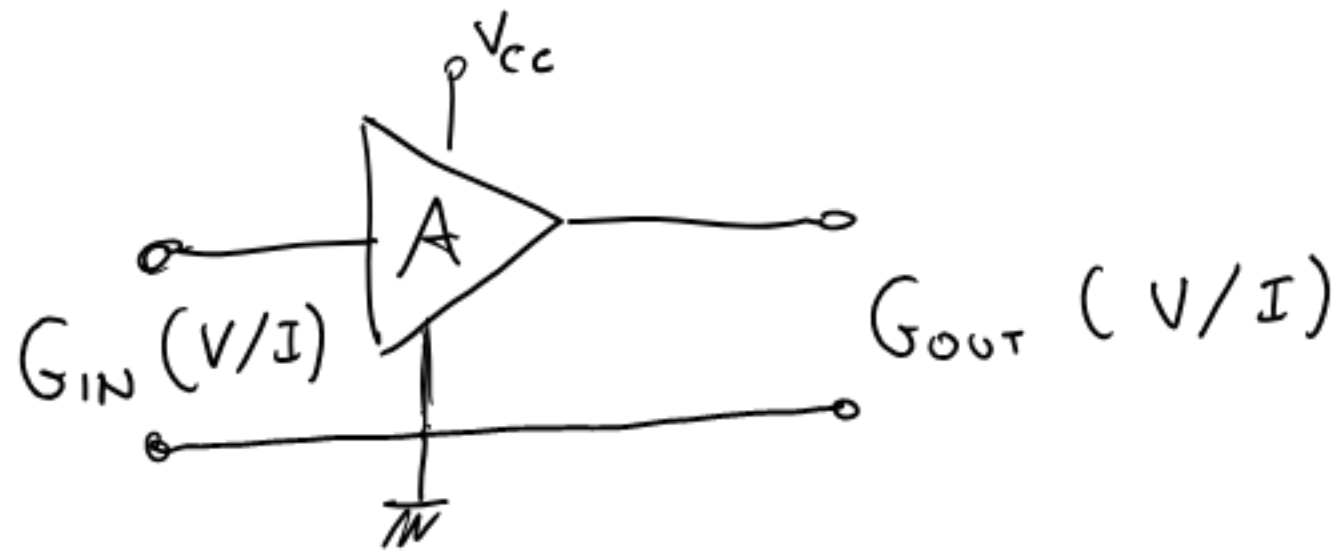
Software / GUI

21104 (4)



C / LABVIEW / PYTHON

AMPLIFICATORI



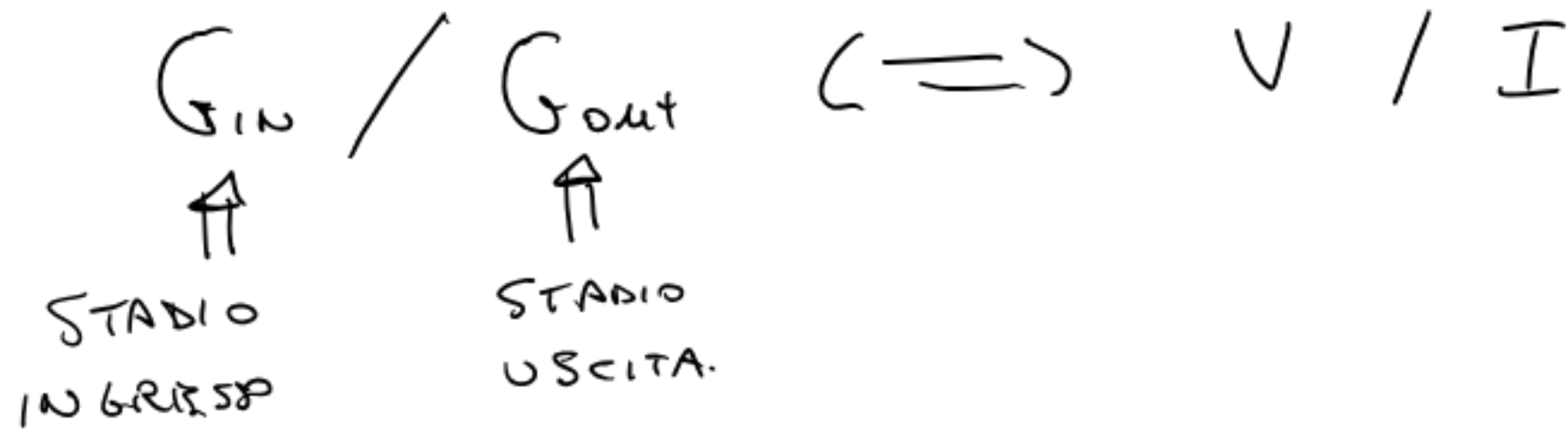
$$G_{OUT} = A \cdot G_{IN}$$

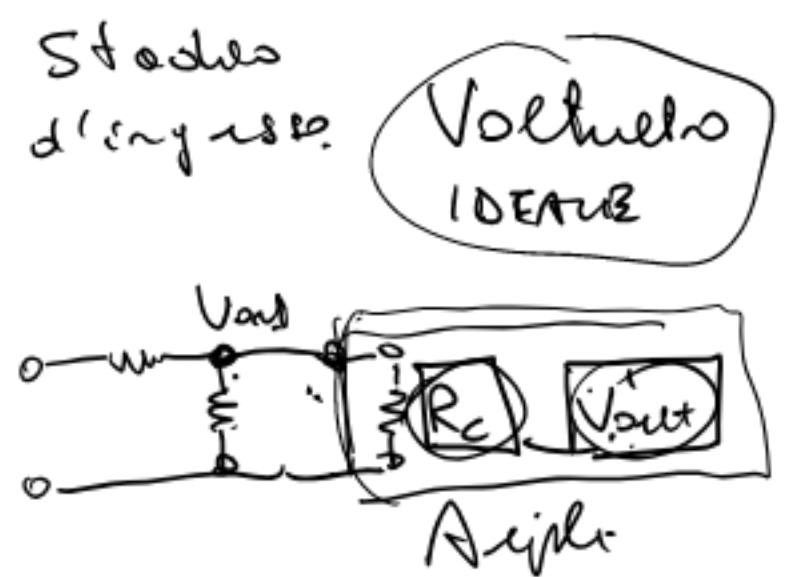
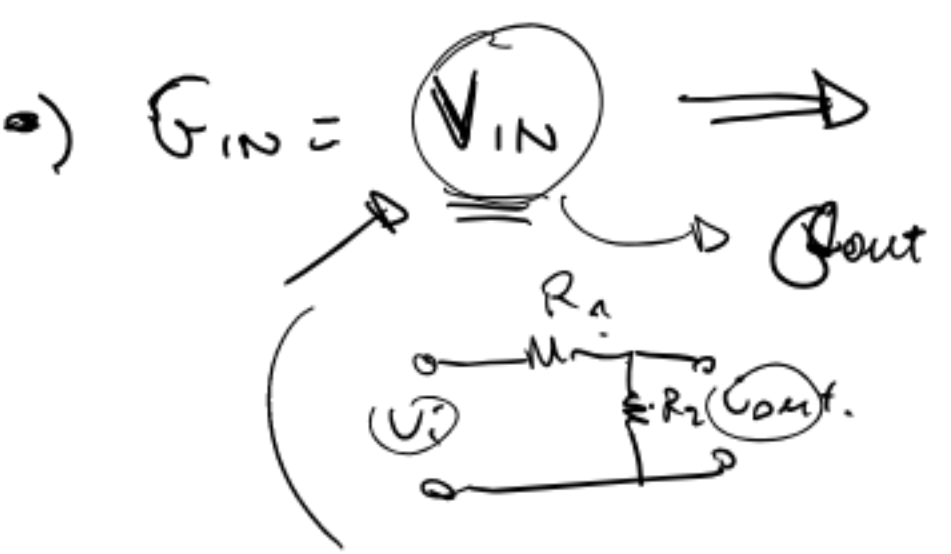
$|A| > 1$ guadagno

Dispositivo ATTIVO

$G_{out} \propto G_{IN}$ [G_{out} pilotata da G_{IN}]

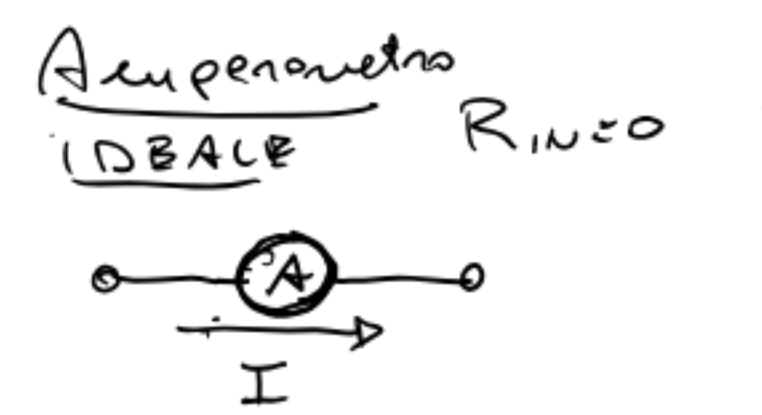
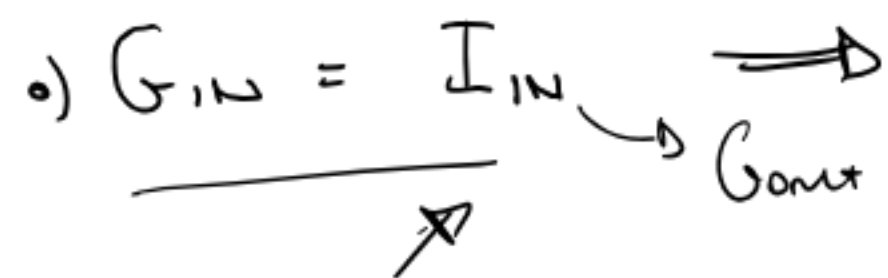
Amplif. IDEALE: A costante. $f, V_{in}, I_{in} \dots$



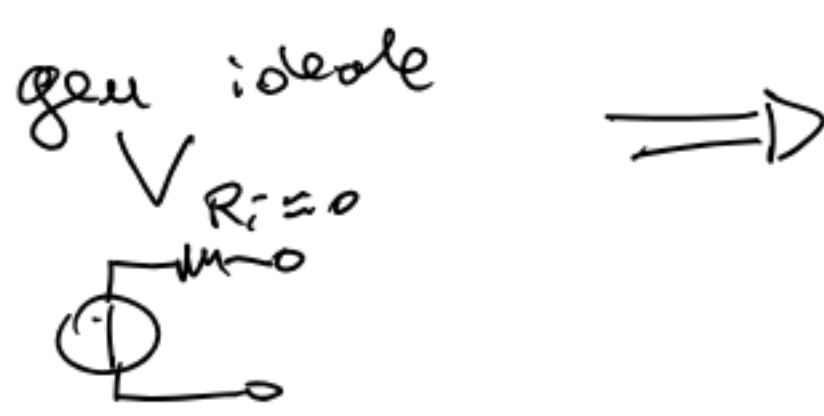
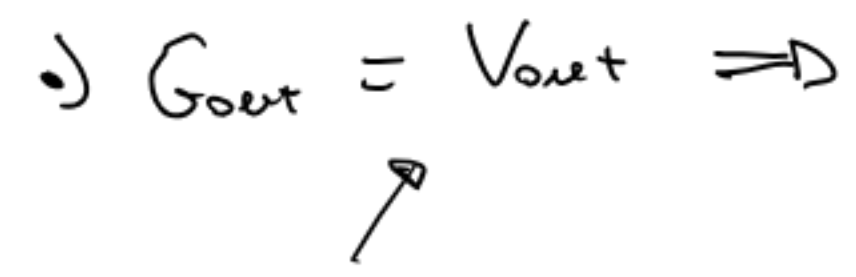


$\Rightarrow \underline{Z_{IN}^{(V)} = +\infty}$

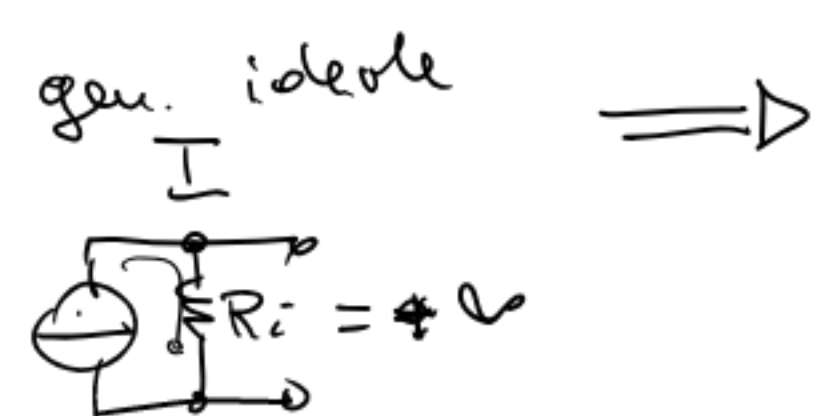
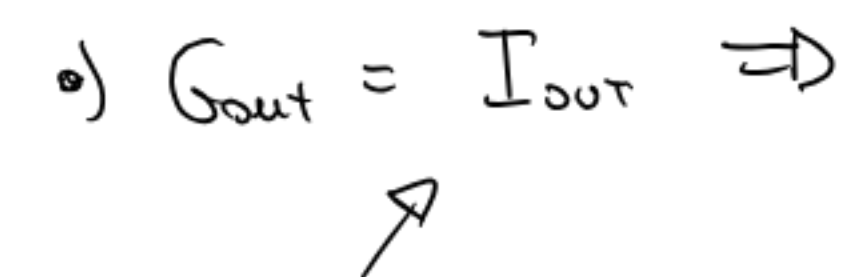
$R_c = +\infty$



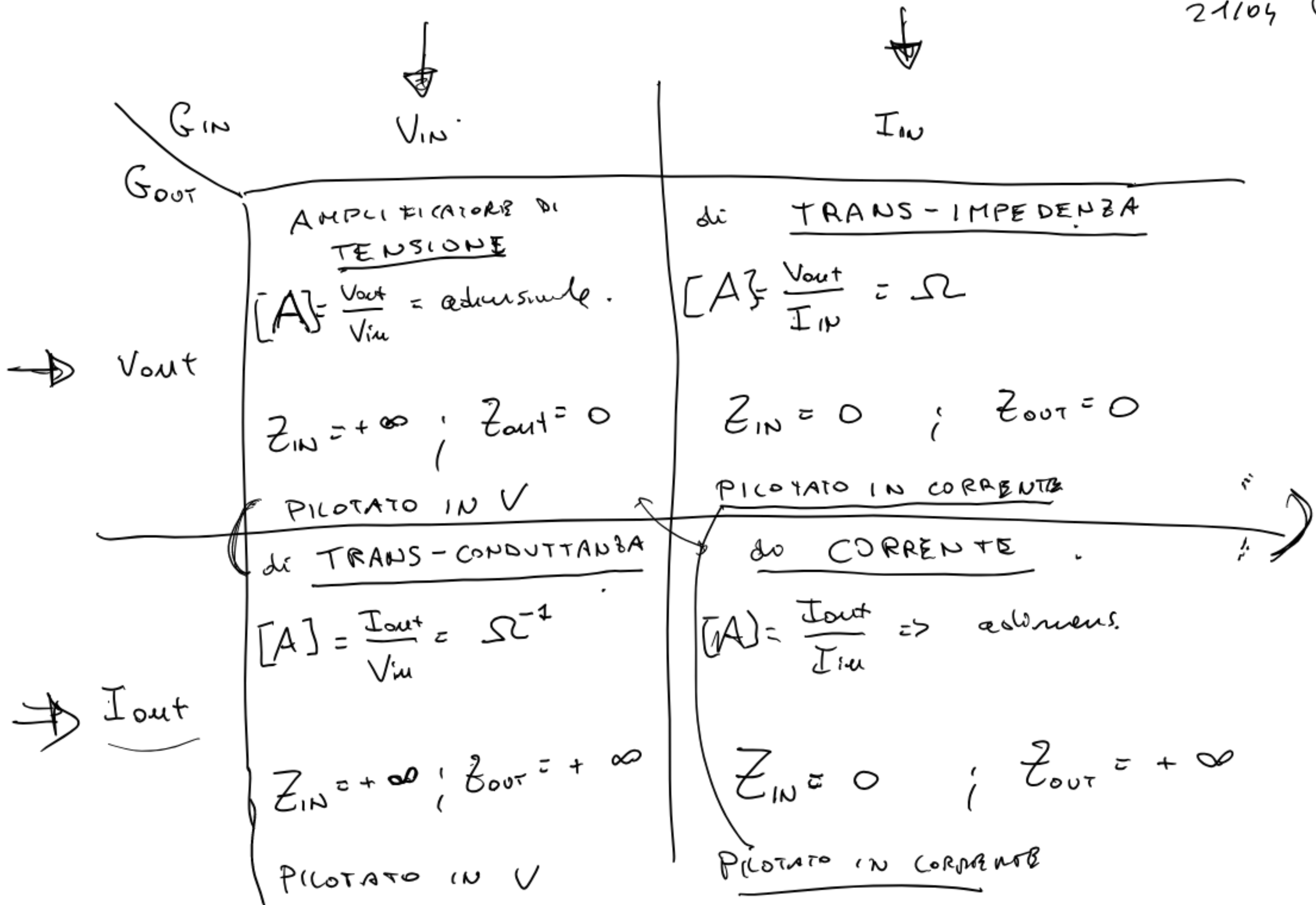
$\Rightarrow \underline{Z_{IN}^{(I)} = 0}$

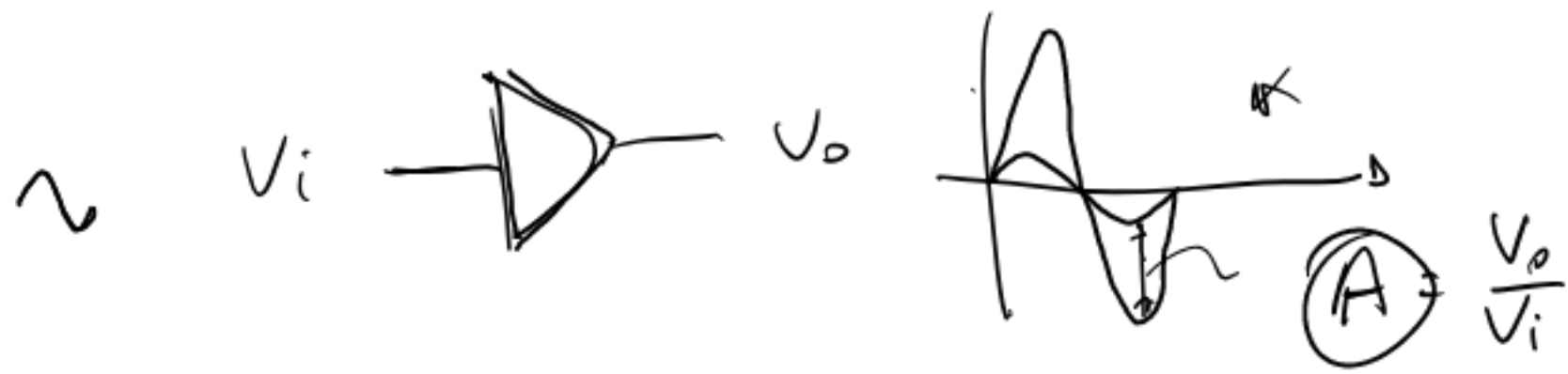


$\Rightarrow \underline{Z_{OUT}^{(V)} = 0}$



$\Rightarrow \underline{Z_{OUT}^{(I)} = +\infty}$



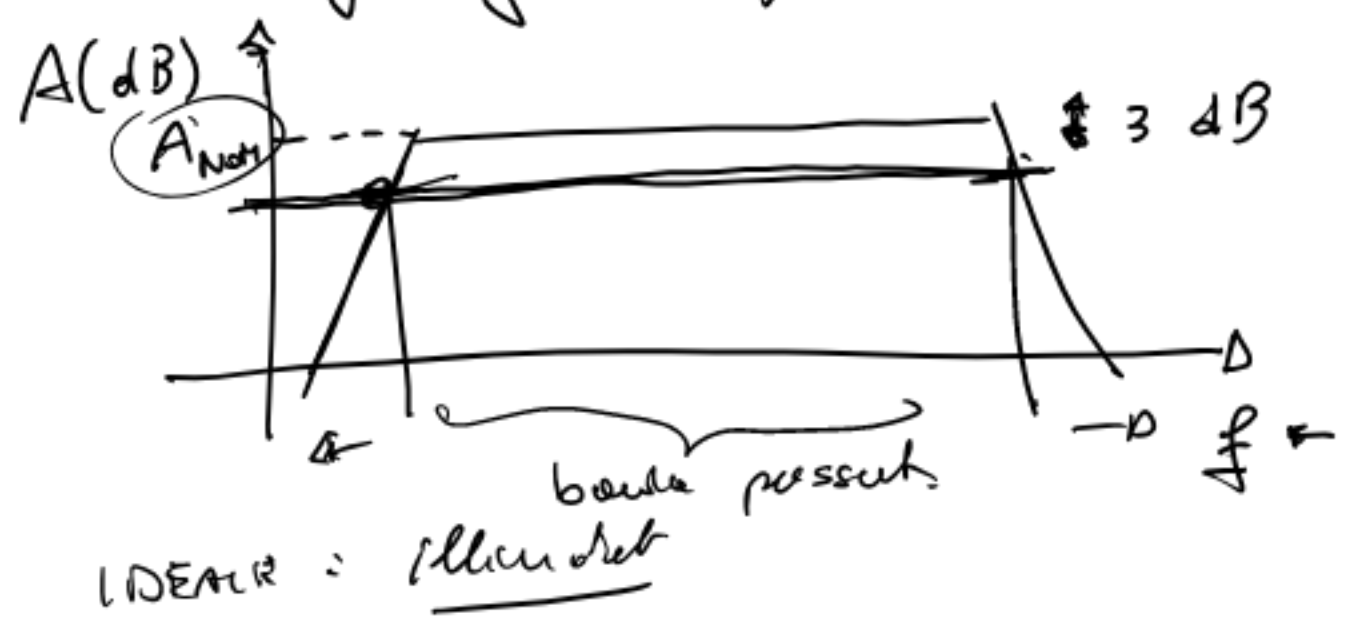


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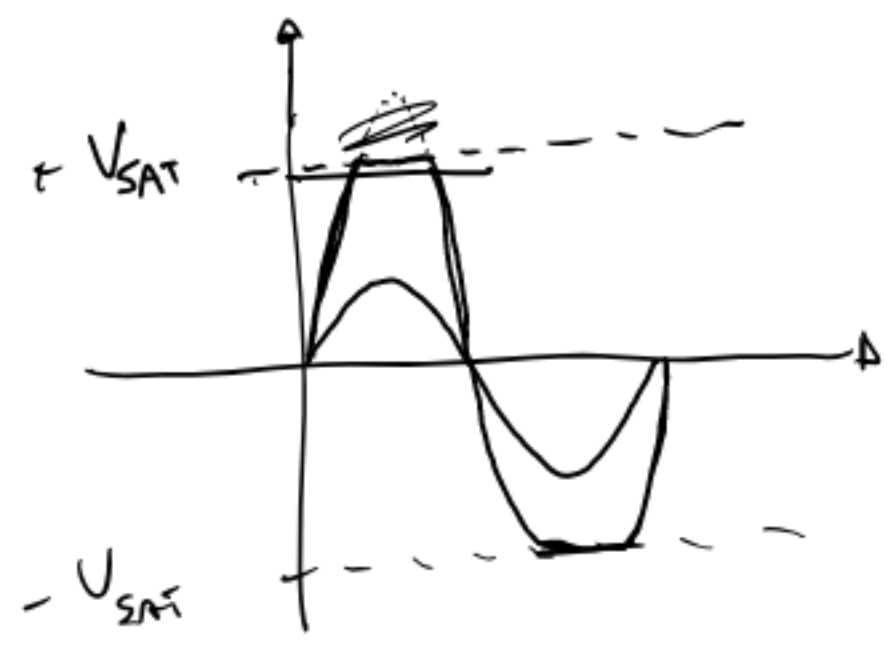
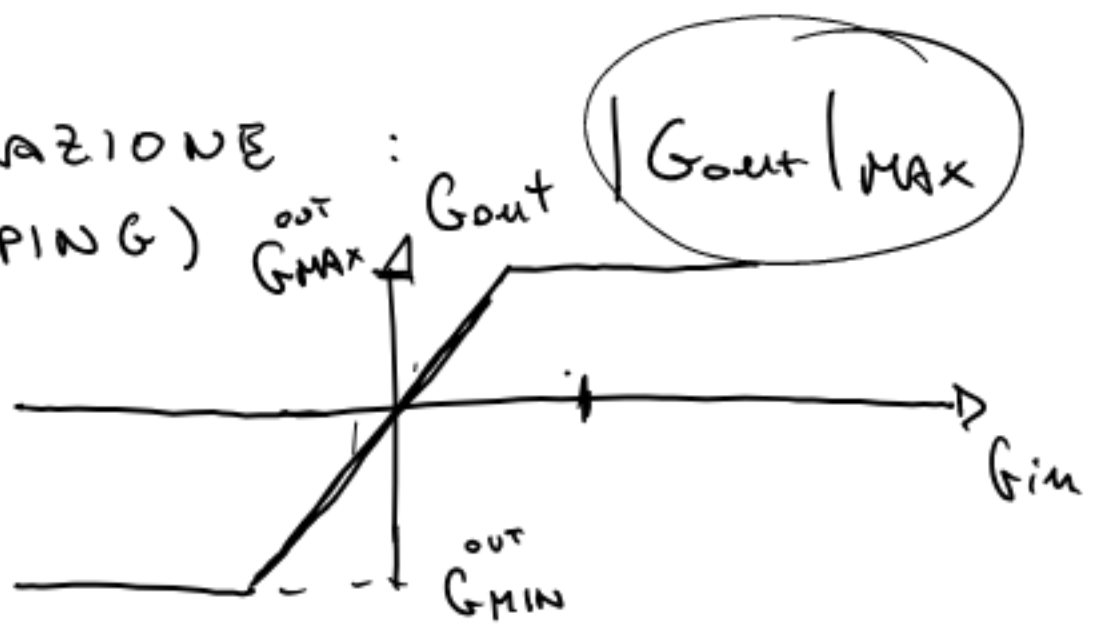
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CARATTERISTICHE AMPLI REACE

- BANDA PASSANTE : range of f $A \approx \text{cost}$ entro 3 dB



- SATURAZIONE (CLIPPING)

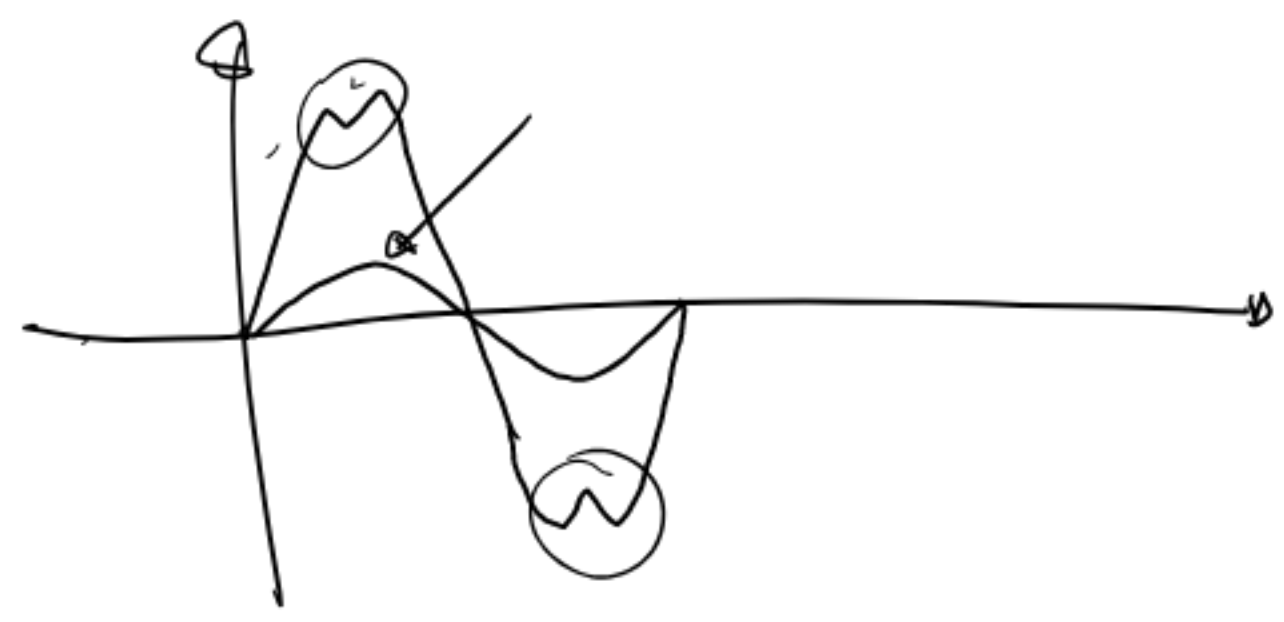


IDEAL
NO SAT

- THD : Total Harmonic Distortion

$G_{IN} = SIN$

$G_{out} =$ Armonica fondamentale + Armoniche ord. sup.



Ampl. V.

$V_i =$ ampiezze armoniche ordine i

$$THD = \sqrt{\sum_{i=1}^{\infty} \left(\frac{V_i}{V_0} \right)^2}$$

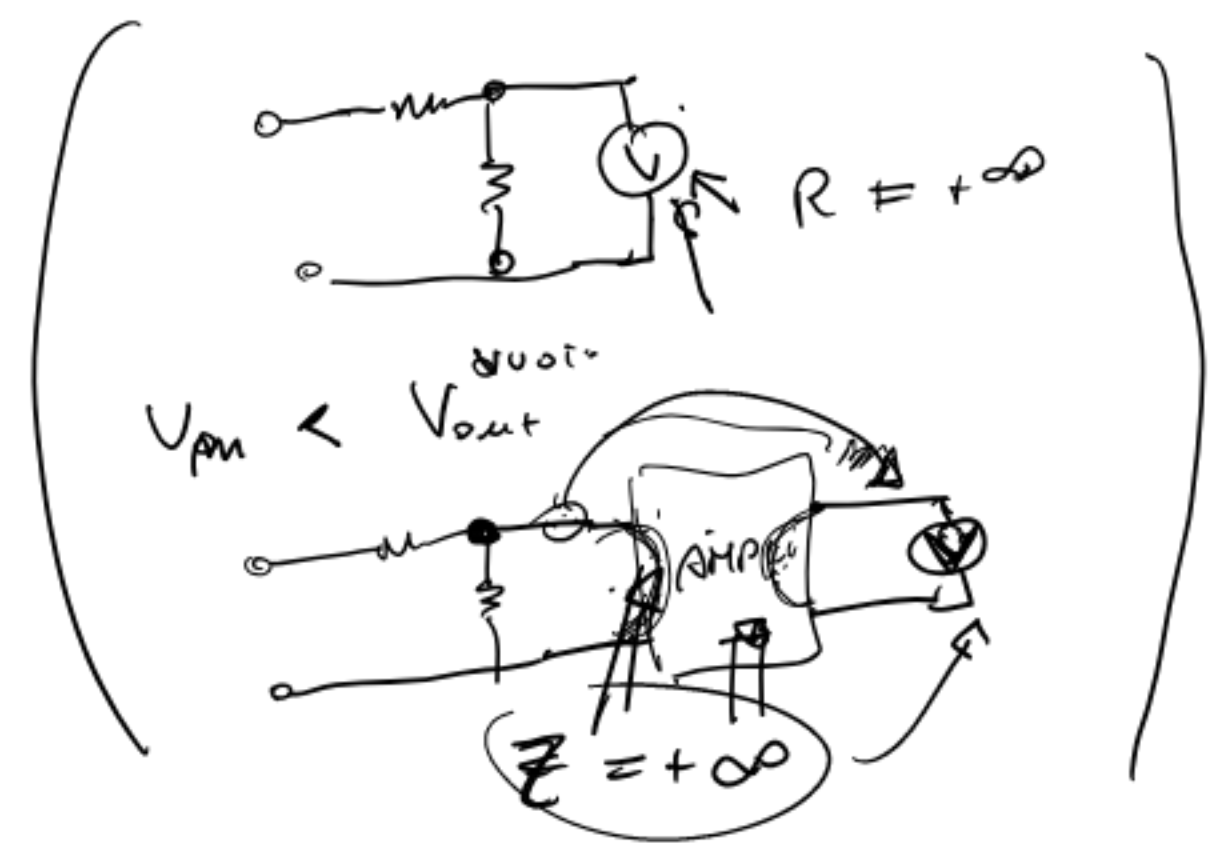
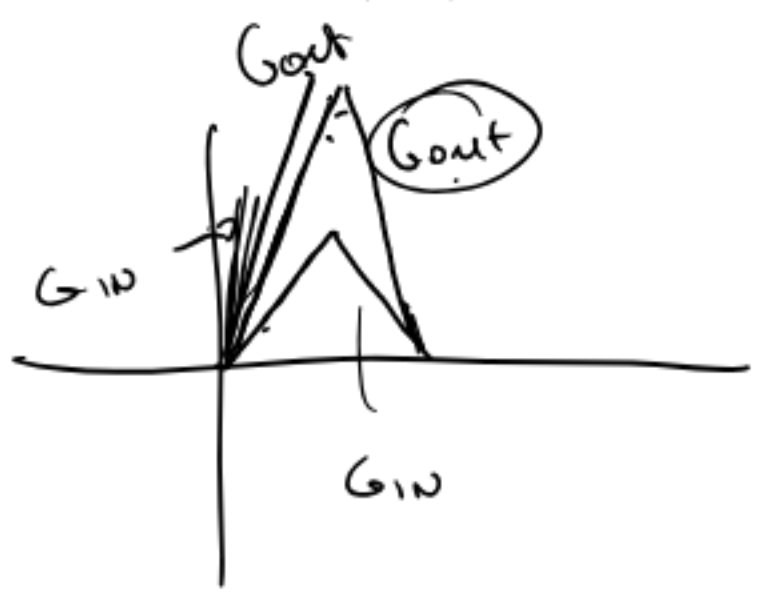
V_0 AMPIEZZA ARMONICA FONDAMENTALE
 V_{OUT}

- ZONA LINEARE : range G_{IN}

$G_{out} = A \cdot G_{in}$
 $A = \cos t$



- SLEW RATE : velocità in di risposta di G_{out} , al varare di G_{in} .



NON SAT.

$V_{out} < V_{SAT}$

$\Rightarrow V_{in} < \frac{V_{SAT}}{A}$

$V_{out} = A V_{in}$

$V_{in} > \frac{V_{SAT}}{A} \Rightarrow V_{out} = V_{SAT}$