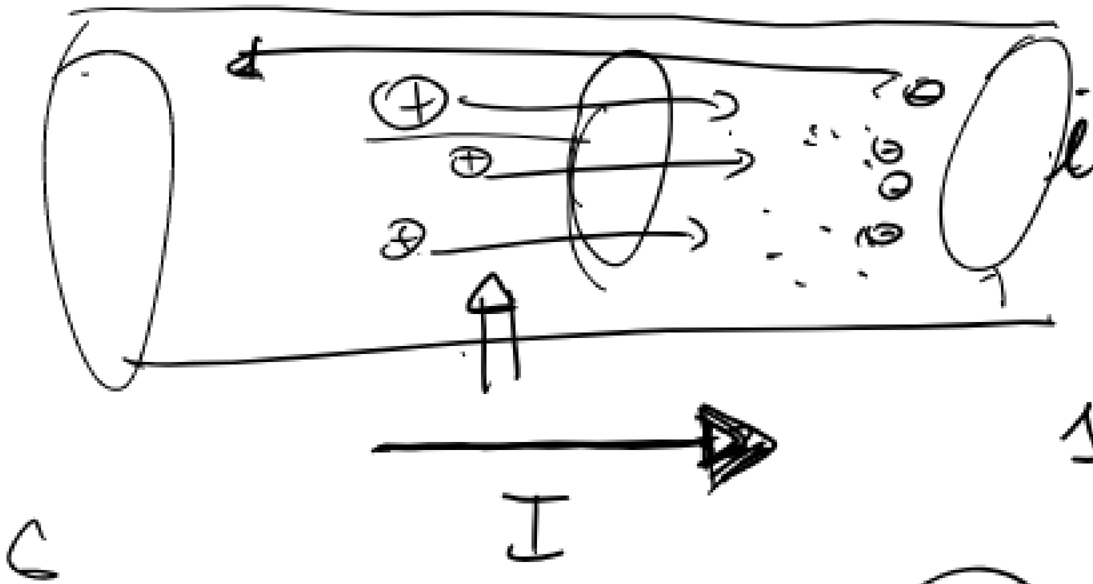
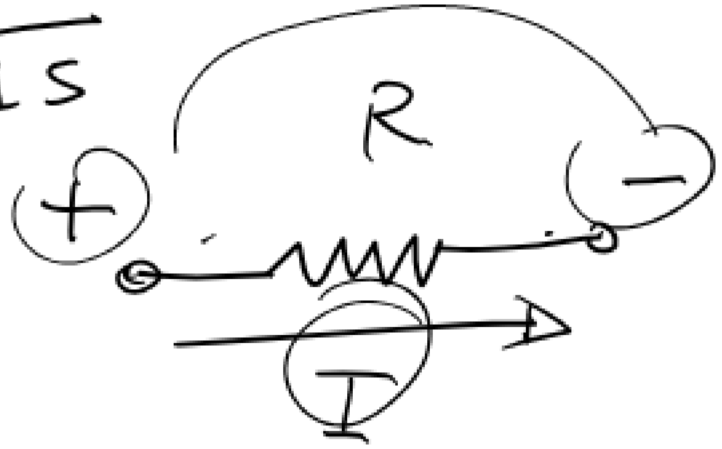
GRANDEZZE ELETTRICHE

INTENSITÀ DI CORRENTE



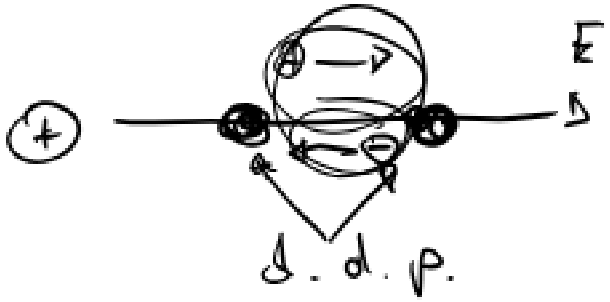
$i(t) = \frac{dQ}{dt}$ Ampere.

$1A = \frac{1C}{1S}$

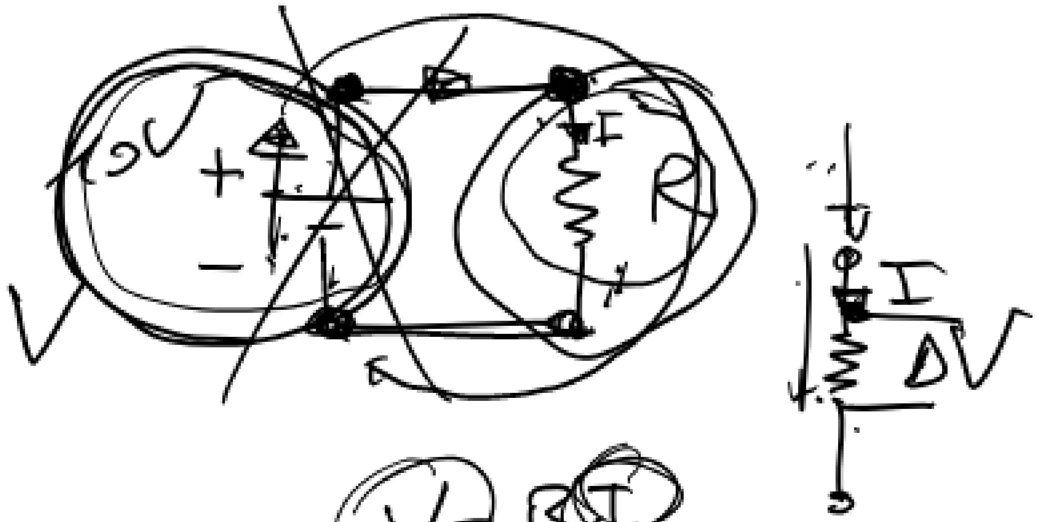


Conduttore e^-

DIFFERENZA DI POTENZIALE



Volt



$V = RI$

FORZA ELETTROMOTRICE : d.d.p. da un generatore

CADUTA DI TENSIONE : d.d.p. ai capi utilizzatore per effetto della corrente che circola

POTENZA ELETTRICA

$$\mathcal{L} = Q(V_2 - V_1) = Q \cdot \Delta V \qquad \Delta V = \text{cost.}$$

$$P = \frac{d\mathcal{L}}{dt} = \Delta V \cdot \frac{dQ}{dt} = \Delta V \cdot i$$

Regime sinusoidale

S → Potenza attiva

S → " reattiva

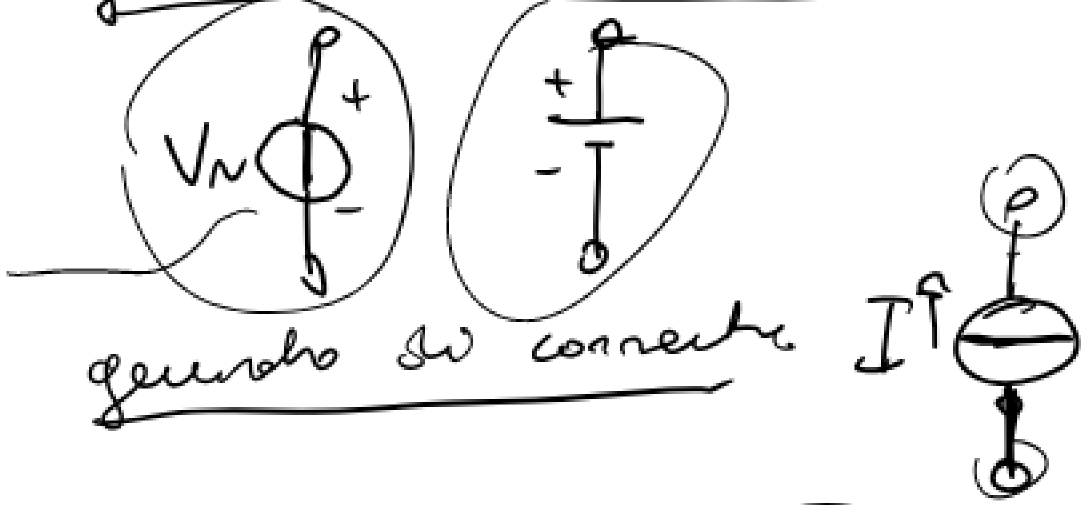
$$S = \bar{V} \cdot \bar{I}$$

$V(t)$ $\qquad$ $I(t)$

ELEMENTI CIRCUITALI "CONDUTTIVI"

→ NO SEMICONDUTTORI

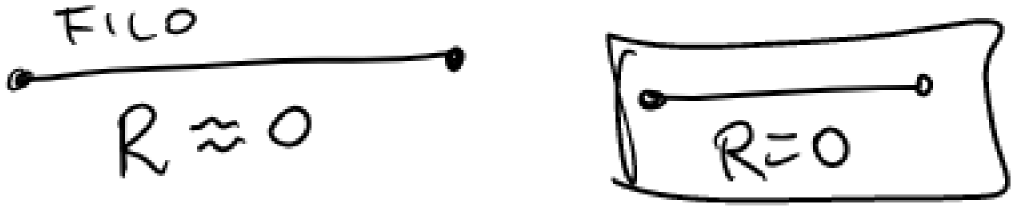
ATTIVI forniscono ~~energia~~ energia : generatori tensione



generatore di corrente

PASSIVI dissipano energia

Resistenze R



REATTIVI accumulano energia per poi rilasciarla

E elettrostatica

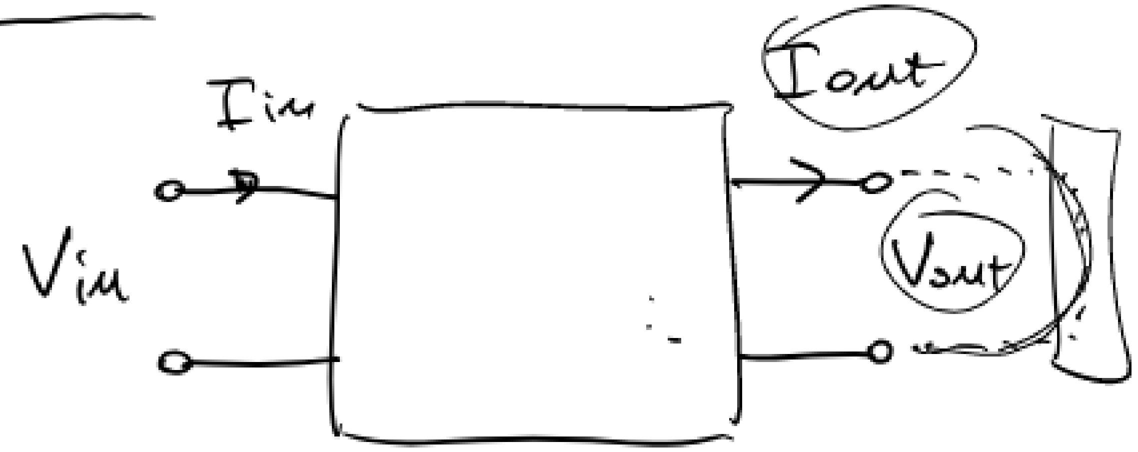
- CONDENSATORI C
- INDUTTANZE L

Em. magnetica

DIPOLI ELETTRICI

$$\boxed{I = f(V_{AB})}$$

QUADRUPOLI

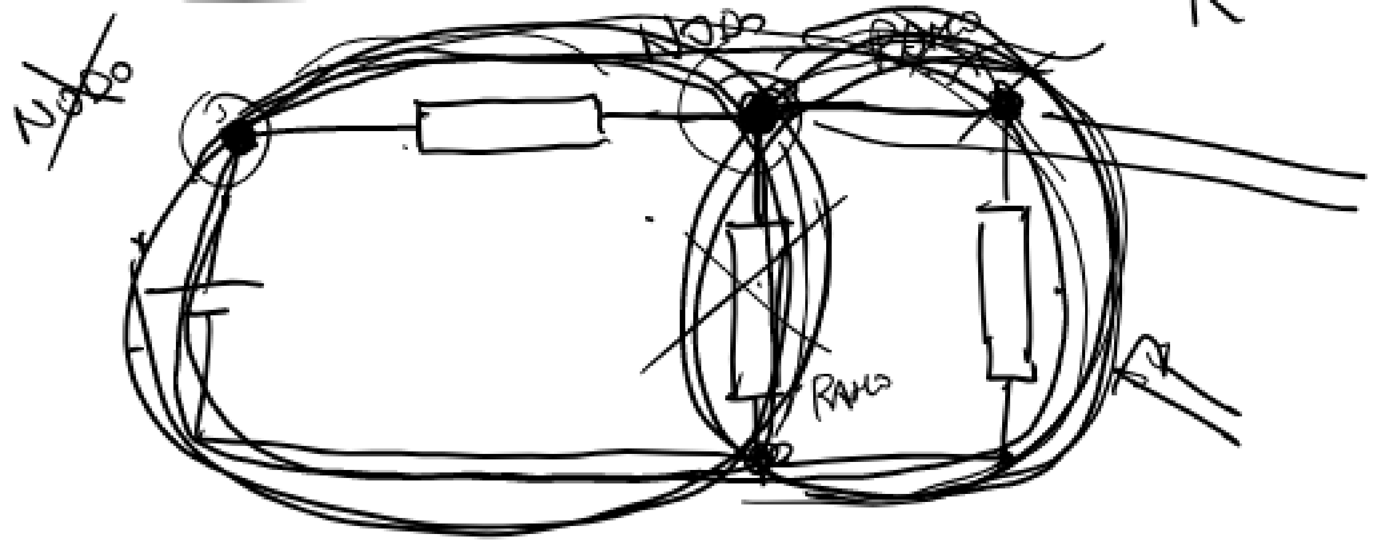


Funzione di trasferimento

$V_{out} = f(V_{in}, I_{in})$

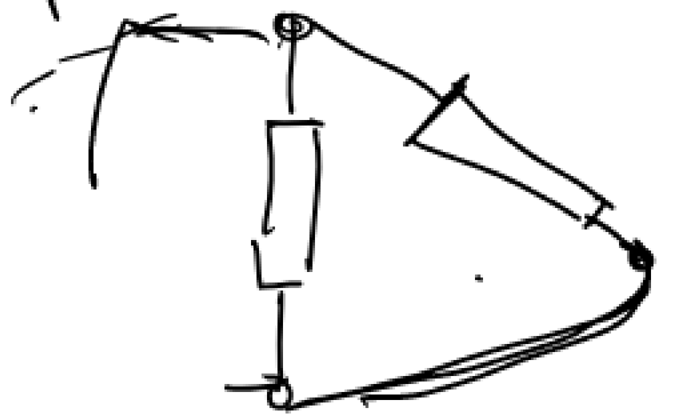
$I_{out} = g(V_{in}, I_{in})$

CIRCUITO ELETTRICO



R=0

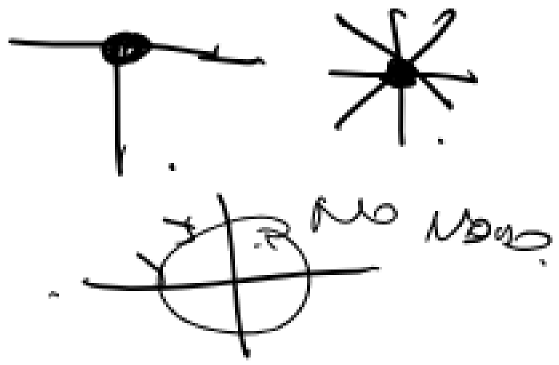
stesso potenziale



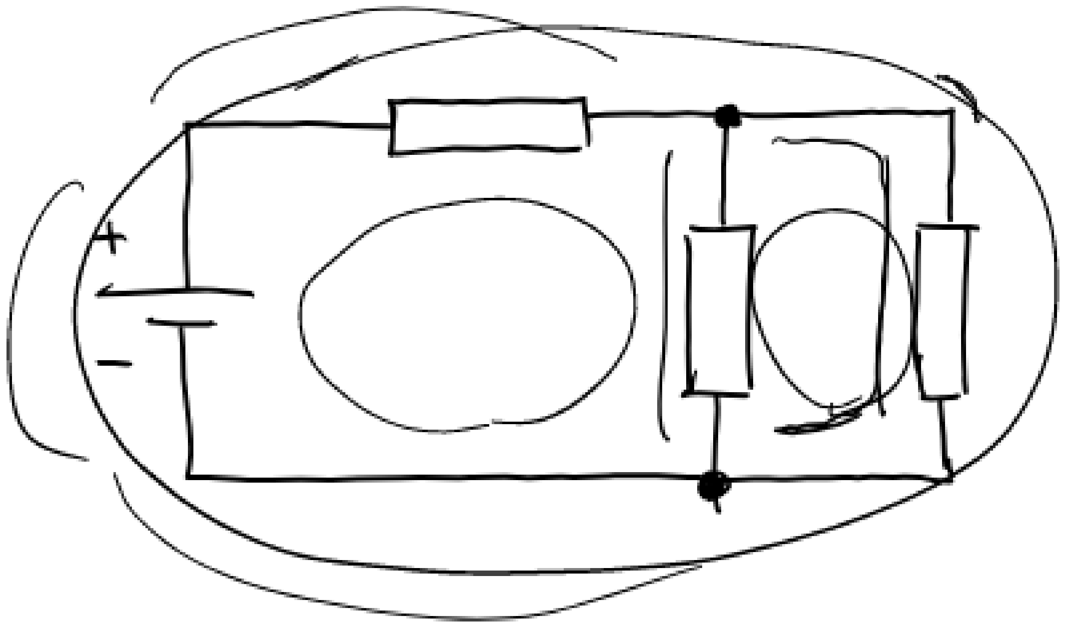
RAMI: pezzo di circuito compreso fra due punti che contiene un dipolo.

>2

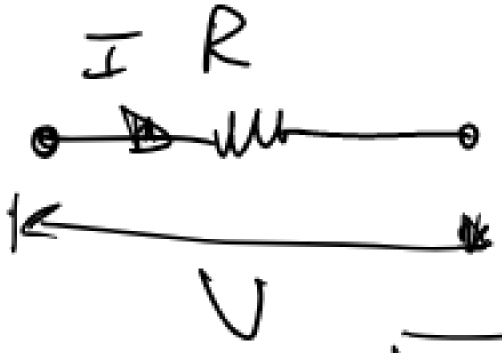
NODO: punto in cui confluiscono più di 2 RAMI.



MAGLIA: qualsiasi percorso chiuso.



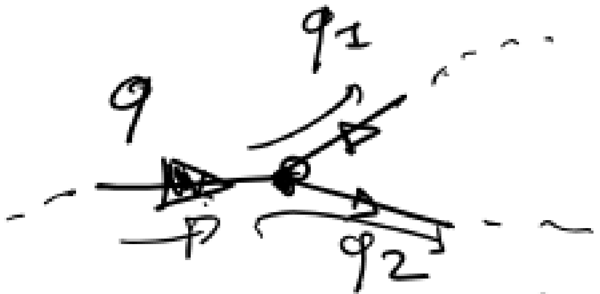
LEGGI E PRINCIPI DEI CIRCUITI



LEGGE DI OHM $\qquad V = RI$

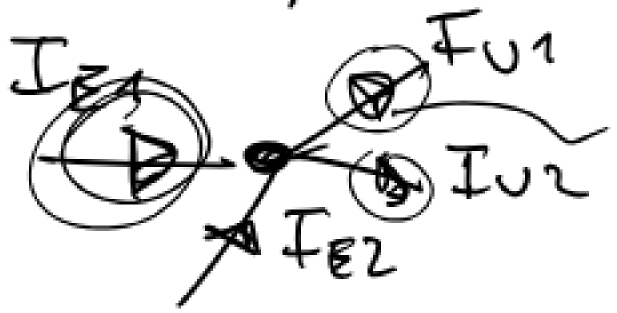
I PRINCIPIO DI KIRCHHOFF (NODI) $\qquad \boxed{\sum_n I_n = 0}$

Deriva da consev. Q



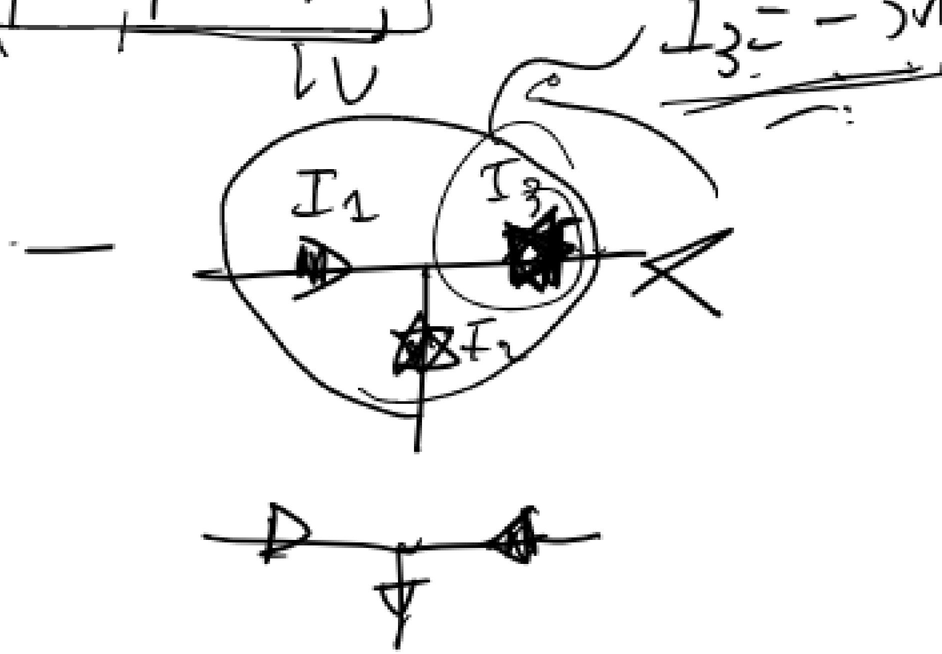
$\boxed{q = q_1 + q_2}$

$$\sum_i I_{ENTRANTI} = \sum_j I_{USCENTI}$$



$$\sum_i I_E - \sum_j I_U = 0$$

$$\boxed{\sum_n I_n = 0}$$



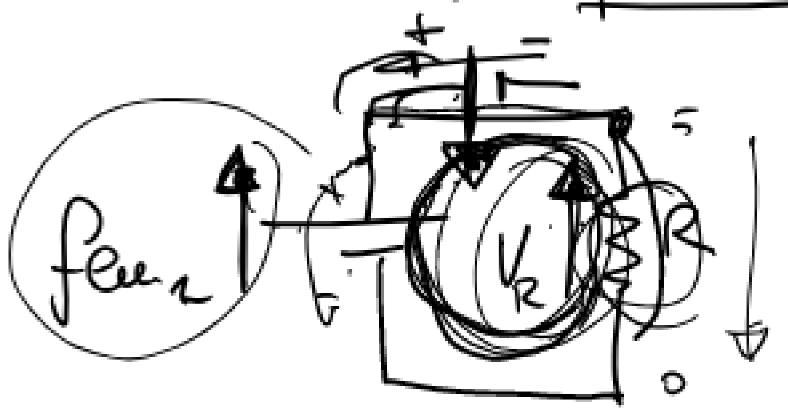
II PRINCIPIO DI KIRCHHOFF (MAGLIA)

cons. energia

per ogni maglia $\boxed{\sum_n \Delta V_n = 0}$

$\boxed{\sum fem = \sum \Delta V}$ Utilizzatori

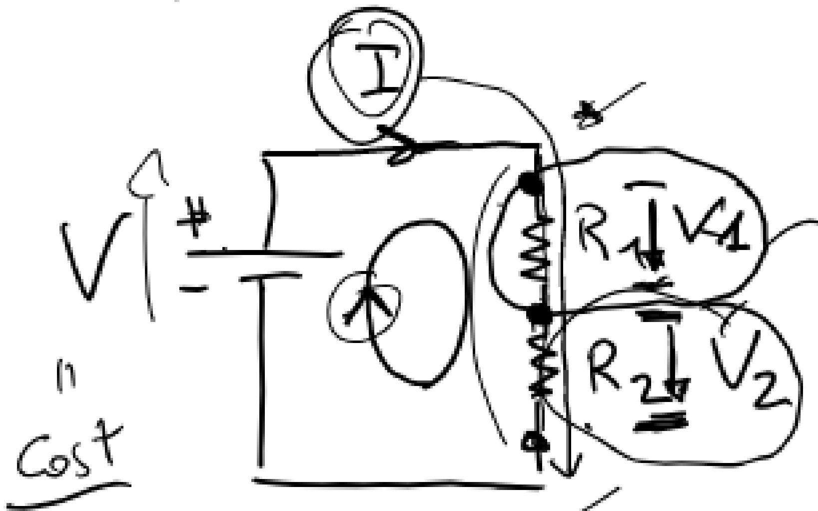
$\sum fem - \sum \Delta V_i = 0$



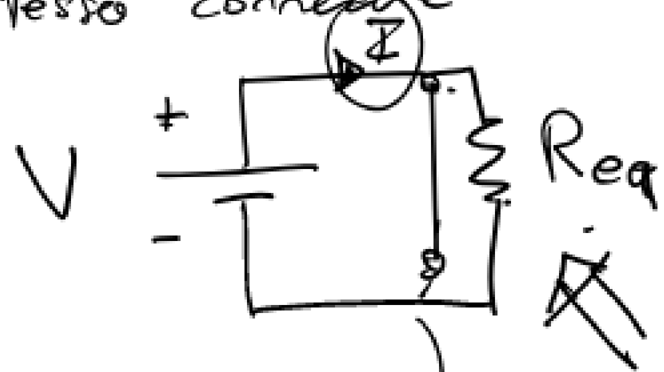
$fem_1 - fem_2 = V_R$ $= R \cdot I$

R - SERIE

percorse dallo stesso corrente



$\xrightarrow{eq}$



$V = R_{eq} \cdot I$

$V_1 = R_1 \cdot I$

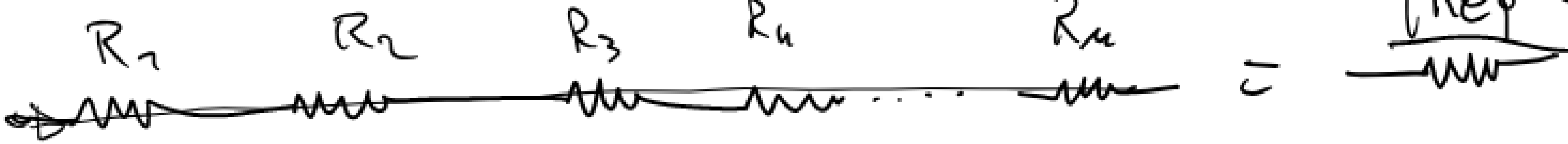
$V_2 = R_2 \cdot I$

$\sum f_{em} = \sum \Delta V$

$V = V_1 + V_2$

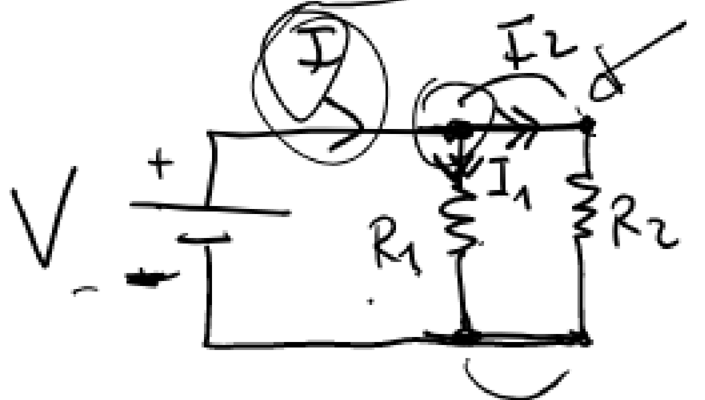
$R_{eq} \cdot \cancel{I} = R_1 \cdot \cancel{I} + R_2 \cdot \cancel{I} \Rightarrow \boxed{R_{eq} = R_1 + R_2}$

$\boxed{R_{eq} = \sum_{i=1}^{n} R_i}$



R - PARALLELO

stessa d.d.p. a tutte le R



$V = R_{eq} I \Rightarrow I = \frac{V}{R_{eq}}$

$\sum I_E = \sum I_U$

$I = I_1 + I_2$

$V = R_1 \cdot I_1 \Rightarrow I_1 = \frac{V}{R_1}$

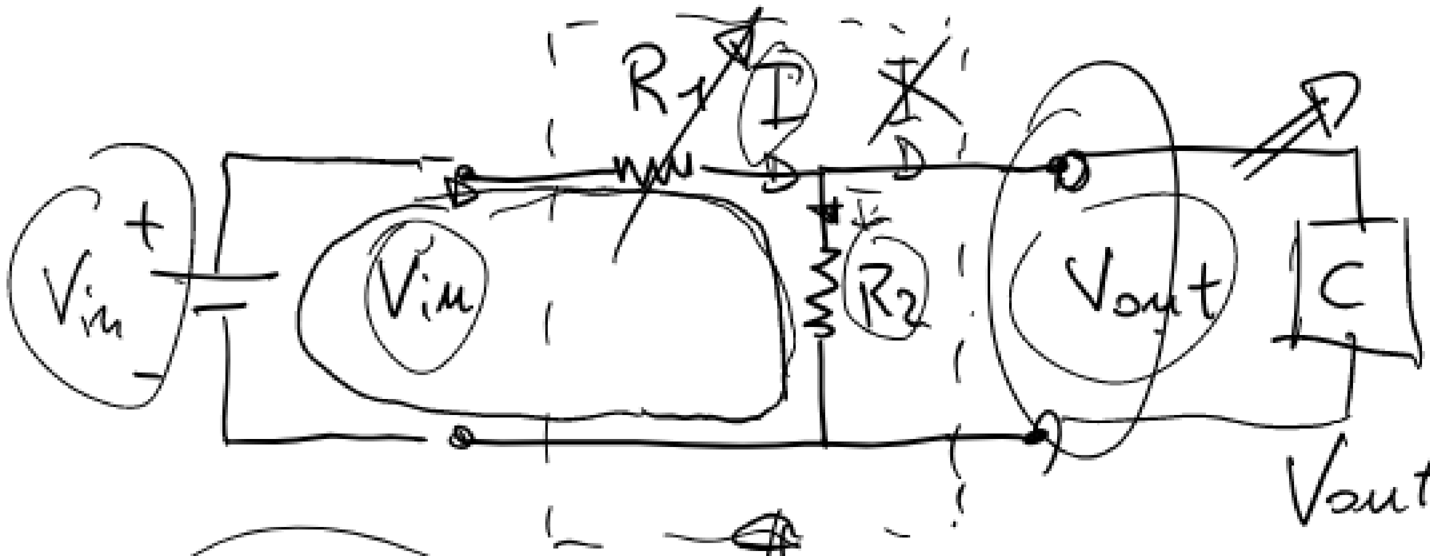
$V = R_2 \cdot I_2 \Rightarrow I_2 = \frac{V}{R_2}$

$\frac{\cancel{V}}{R_{eq}} = \frac{\cancel{V}}{R_1} + \frac{\cancel{V}}{R_2} \Rightarrow \boxed{\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}} \Rightarrow R_{eq} = \frac{R_1 \cdot R_2}{R_1 + R_2}$

$\boxed{\frac{1}{R_{eq}} = \sum_{i=1}^{n} \frac{1}{R_i}}$

PARTITORE RESISTIVO

$$V_{out} = f(V_{in}, \underbrace{R_1, R_2})$$



$$V_{out} = R_2 \cdot I$$

$$I = \frac{V_{in}}{\underbrace{R_1 + R_2}_{\text{serie}}}$$

$$V_{out} = R_2 \cdot \frac{V_{in}}{R_1 + R_2}$$

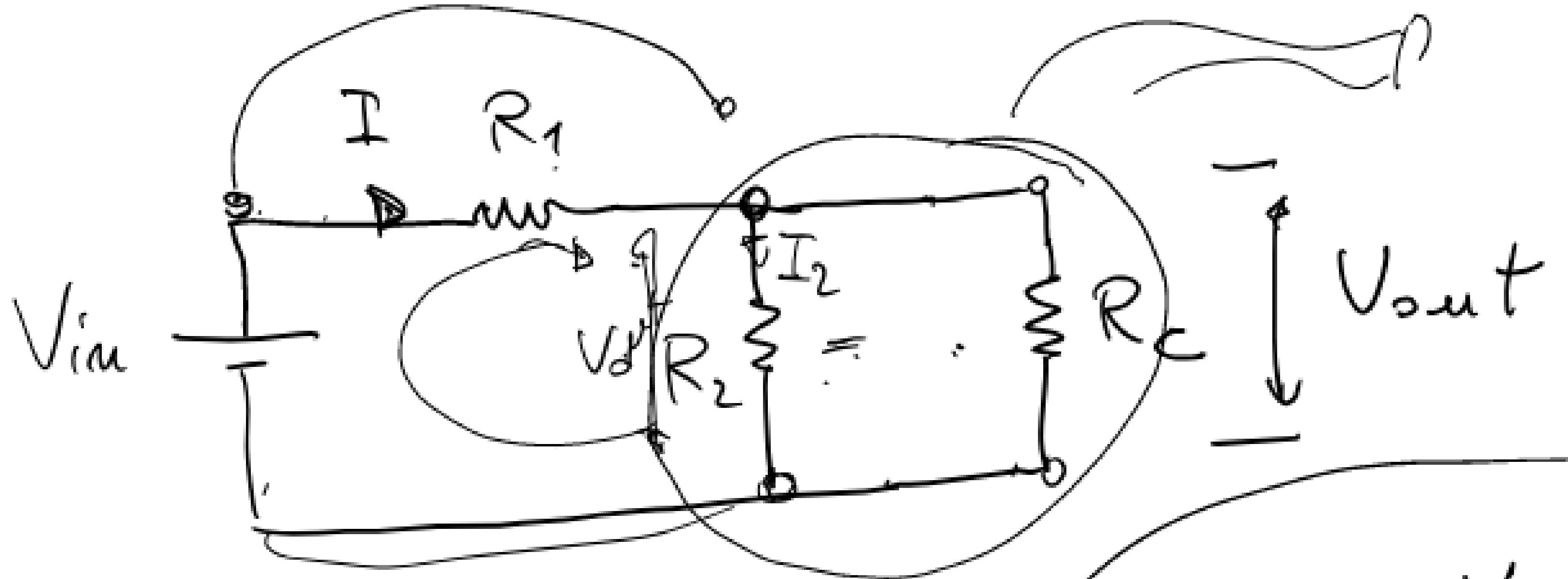
$$\boxed{V_{out} = V_{in} \cdot \frac{R_2}{R_1 + R_2}}$$

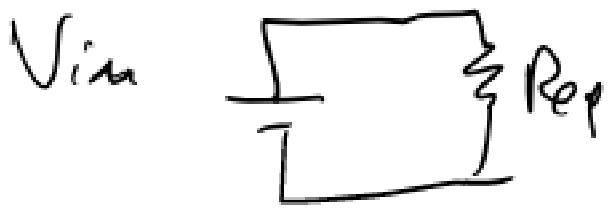
$V_{out} < V_{in}$.

$$\frac{R_2}{R_1 + R_2} < 1$$

Funzione di trasferimento a vuoto senza carico

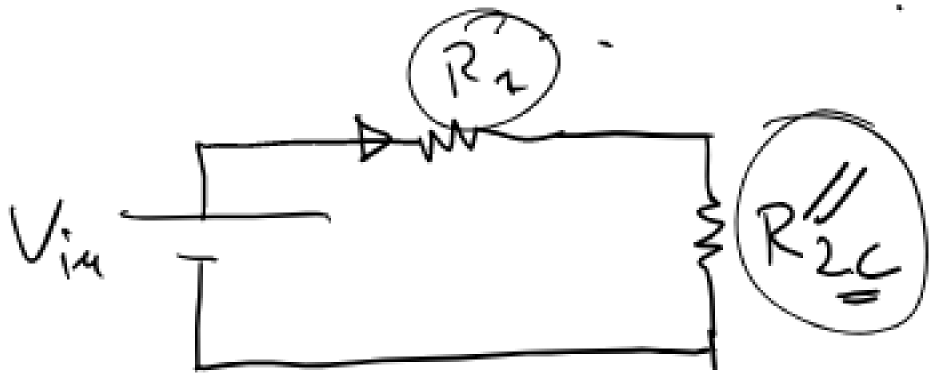
Partitore Resistivo con carico



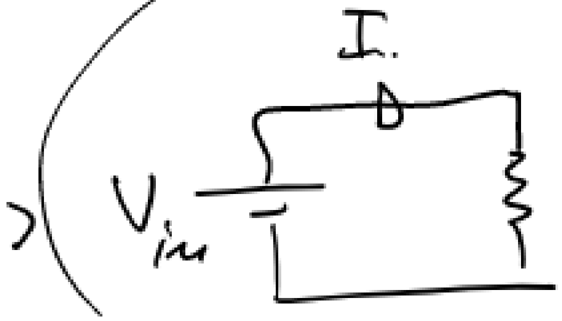


$$R''_{2C} = \frac{R_2 \cdot R_C}{R_2 + R_C}$$

$$V_{in} = R_1 \cdot I + V_{out} \Rightarrow V_{out} = V_{in} - R_1 \cdot I$$



$\Rightarrow$



$$R_{eq} = R_1 + R''_{2C}$$

$$I = \frac{V_{in}}{R_{eq}} = \frac{V_{in}}{R_1 + R''_{2C}}$$

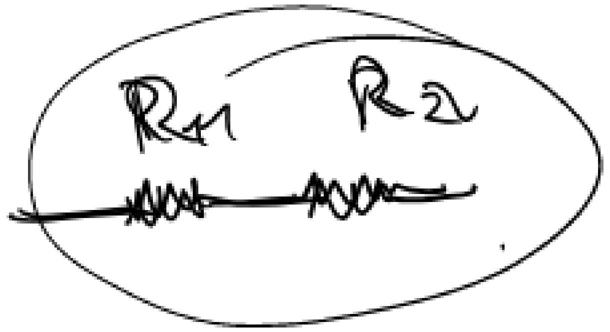
$$V_{out} = V_{in} - R_1 \cdot \frac{V_{in}}{R_1 + R''_{2C}} =$$

$$V_{out} = V_{in}\left(1 - \frac{R_1}{R_1 + R''_{2C}}\right) = V_{in}\,\frac{\cancel{R_1} + R''_{2C} - \cancel{R_1}}{R_1 + R''_{2C}} = V_{in}\,\frac{R_2 \cdot R_C}{\left(R_1 + \frac{R_2 \cdot R_C}{\cancel{R_2+R_C}}\right)\cancel{(R_2+R_C)}}$$

$$\boxed{V_{out} = V_{in}\,\frac{R_2 R_C}{R_1 R_2 + R_1 R_C + R_2 R_C}} = V_{in}\,\frac{R_2}{R_1 + R_2 + \frac{R_1 R_2}{R_C}}$$

$$\frac{R_1 R_2}{R_C} \to 0$$

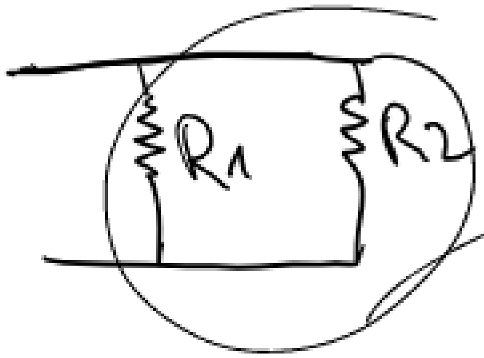
$$R_C \xrightarrow{\text{GRANDE}} \infty$$



gnd.

$$R_{eq} = \cancel{R_1} + R_2 \simeq R_2 \qquad R_2 \gg R_1$$

$\cancel{\boxed{1\,\Omega}}$ $\boxed{1\,M\Omega}$



$$R_{eq} = \frac{R_1 R_2}{R_1 + R_2} = \qquad R_2 \gg R_1$$

$$= \cancel{\frac{R_2}{1 + \frac{R_2}{R_1}}} \qquad \frac{R_1}{1 + \frac{R_1}{R_2}} \simeq R_1 \qquad \frac{R_1}{R_2} \to 0$$

$1\,\Omega$ / $1\,M\Omega$

$1\,\Omega$ $10\,\Omega$