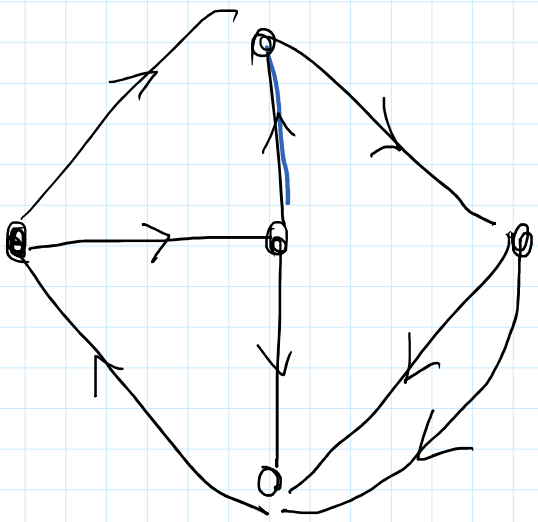
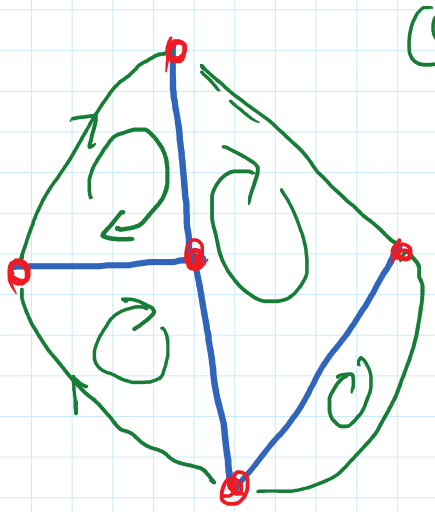
CO-ALBERO

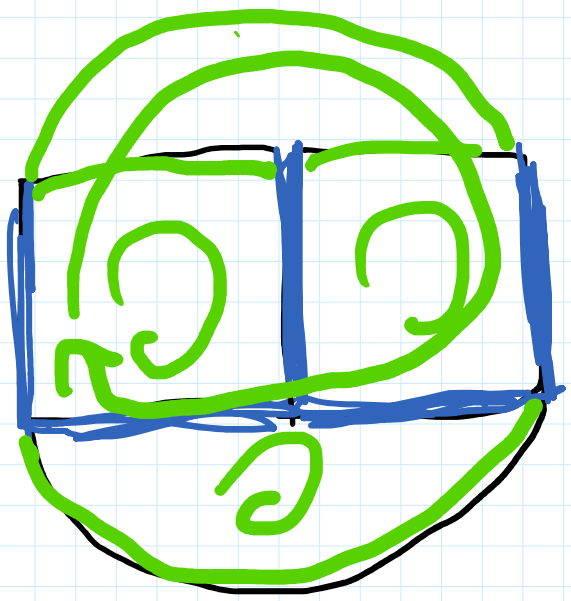
R-N+1 RAMI

R-N+1 correnti
rami co-albero

MAGLIE FONDAMENTALI
COINCIDONO
CON GLI
ANELLI







MAGLIA 1

KVL $V_{C_1} + \sum B_{1k} V_{ak} = 0$

MAGLIA F 2

$V_{C_2} + \sum B_{2k} V_{ak} = 0$

Teoria dei circuiti $\Longleftrightarrow$ KVL meglio fondamentale

$$\left\{ \begin{bmatrix} V_{c_1} \\ V_{c_2} \\ \vdots \\ V_{c_{R-N+1}} \end{bmatrix} + [B] \begin{bmatrix} V_{a_1} \\ V_{a_2} \\ \vdots \\ V_{a_{N-1}} \end{bmatrix} = \begin{bmatrix} 0 \end{bmatrix} \right.$$

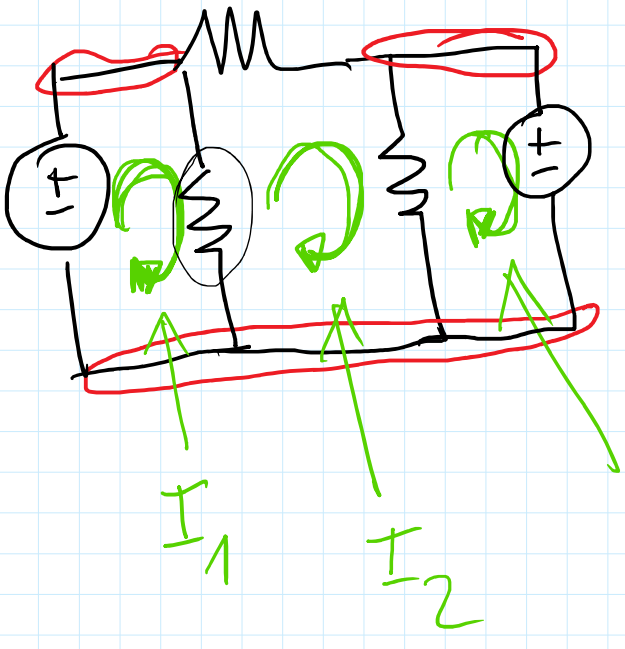
→ SONO EQ NELLE TENSIONI

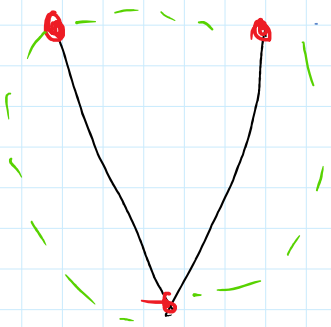
→ INCOGNITE SONO LE CORRENTI DEL COALBERO

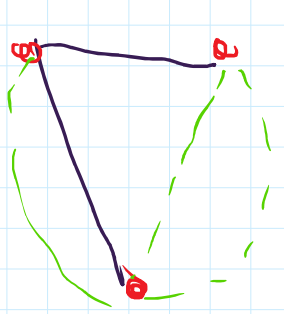
→ $V_k = R_k i_k$ RAMI RESISTIVI

$V_\alpha = V_{g\alpha}$

$V_{I_{g\beta}} = ?$





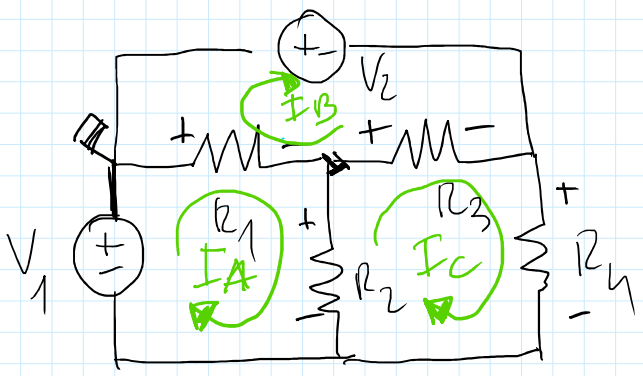


ANELLO 1 { KVL ANELLO 1

ANELLO 2 { KVL ANELLO 2

ANELLO 3 { KVL ANELLO 3

↳ SOSTITUIRE LE TENSIONI DEI RAMI RESISTIVI IN TERMINI DELLE SOLE CORRENTI DI ANELLO

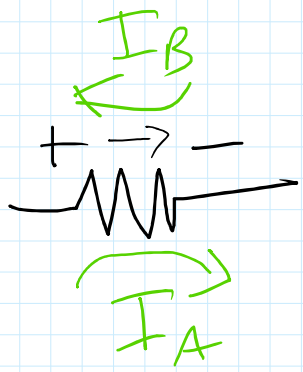


$V_1 = 5\,[V]$

$V_2 = 10\,[V]$

$R_K = K\,[\Omega]$

I_A, I_B, I_C SONO LE INCOGNITE



ANELLO (A) KVL $= V_{R_1} + V_{R_2} - V_1 = 0$

ANELLO (B) $V_2 - V_{R_3} - V_{R_1} = 0$

ANELLO (C) $V_{R_3} + V_{R_4} - V_{R_2} = 0$

$I_{R_1} = I_A - I_B$

$i_{R_2} = (e_A - e_B) G_2 \iff V_{R_1}$ $\quad V_{R_1} = (I_A - I_B) R_1$

$V_{R_2} = (I_A - I_C) R_2$; $V_{R_3} = (I_C - I_B) R_3$; $V_{R_4} = I_C R_4$

(A) $(I_A - I_B) R_1 + (I_A - I_C) R_2 = V_1$

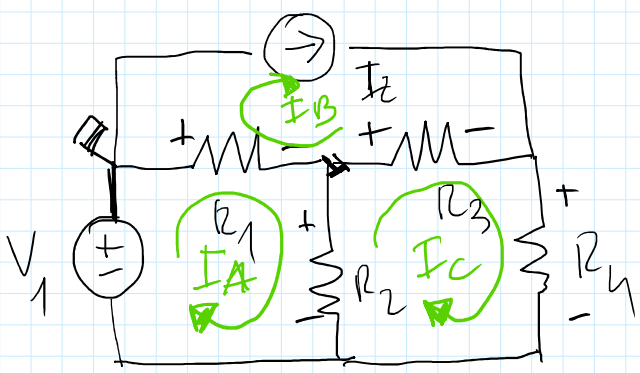
(B) $-(I_C - I_B) R_3 - (I_A - I_B) R_1 = -V_2$

(C) $(I_C - I_B) R_3 + I_C R_4 - (I_A - I_C) R_2 = 0$

$$\begin{bmatrix} R_1+R_2 & -R_1 & -R_2 \\ -R_1 & R_1+R_3 & -R_3 \\ -R_2 & -R_3 & R_2+R_3+R_4 \end{bmatrix} \begin{bmatrix} I_A \\ I_B \\ I_C \end{bmatrix} = \begin{bmatrix} V_1 \\ -V_2 \\ 0 \end{bmatrix}$$

$[R][I] = [V]$ ANELLI

$[G][V] = [I]$ NODI



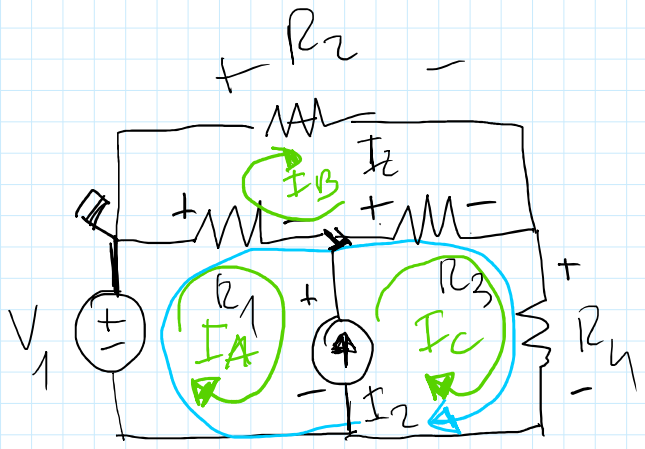
I° CASO

IL GEN. DI CORRENTE COINCIDE CON CORRENTE DI ANELLO

$I_2 = I_B$

II° CASO

IL GEN. DI CORRENTE



IL GEN. DA CORRENTE

È ATTRAVERSATO DA PIÙ CORRENTI DI ANELLO

$$I_2 = I_C - I_A$$

$$I_C = I_2 + I_A$$

$$V_{R1} = (I_A - I_B) R_1$$

$$V_{R2} = I_B R_2$$

$$V_{R3} = (I_C - I_B) R_3 = (I_2 + I_A - I_B) R_3$$

(A) $V_{R1} + V_{I_2} - V_1 = 0$

(B) $V_{R2} - V_{R3} - V_{R1} = 0$

?

(A) $(I_A - I_B) R_1 + V_{I_2} = V_1$

(B) $I_B R_2 - (I_C - I_B) R_3 - (I_A - I_B) R_1 = I_B R_2 - (I_2 + I_A - I_B) R_3 - (I_A - I_B) R_1 = 0$

$I_B (R_2 + R_3 + R_1) - I_A (R_3 + R_1) = I_2 R_3$ $V_1 G$

+ $V_{I_2} = V_{R_3} + V_{R_4}$ KVL (C)

$V_{I_2} = (I_2 + I_A - I_B) R_3 + (I_2 + I_A) R_4$

$(I_A - I_B) R_1 + (I_A - I_B) R_3 + I_A R_4 = V_1 - I_2 R_3 - I_2 R_4$

$I_B (R_1 + R_2 + R_3) - I_A (R_1 + R_3) = I_2 R_3$