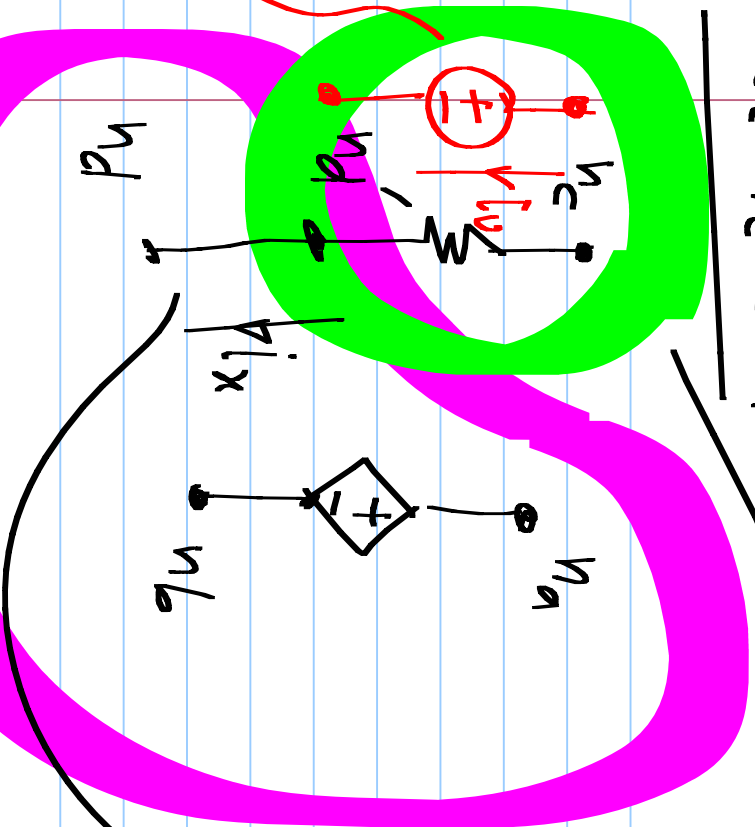


Lecture 8 :



$$\text{KCL: } n_c \begin{bmatrix} g & -g \\ -g & g \end{bmatrix} \begin{bmatrix} v_c \\ v_d' \end{bmatrix}$$

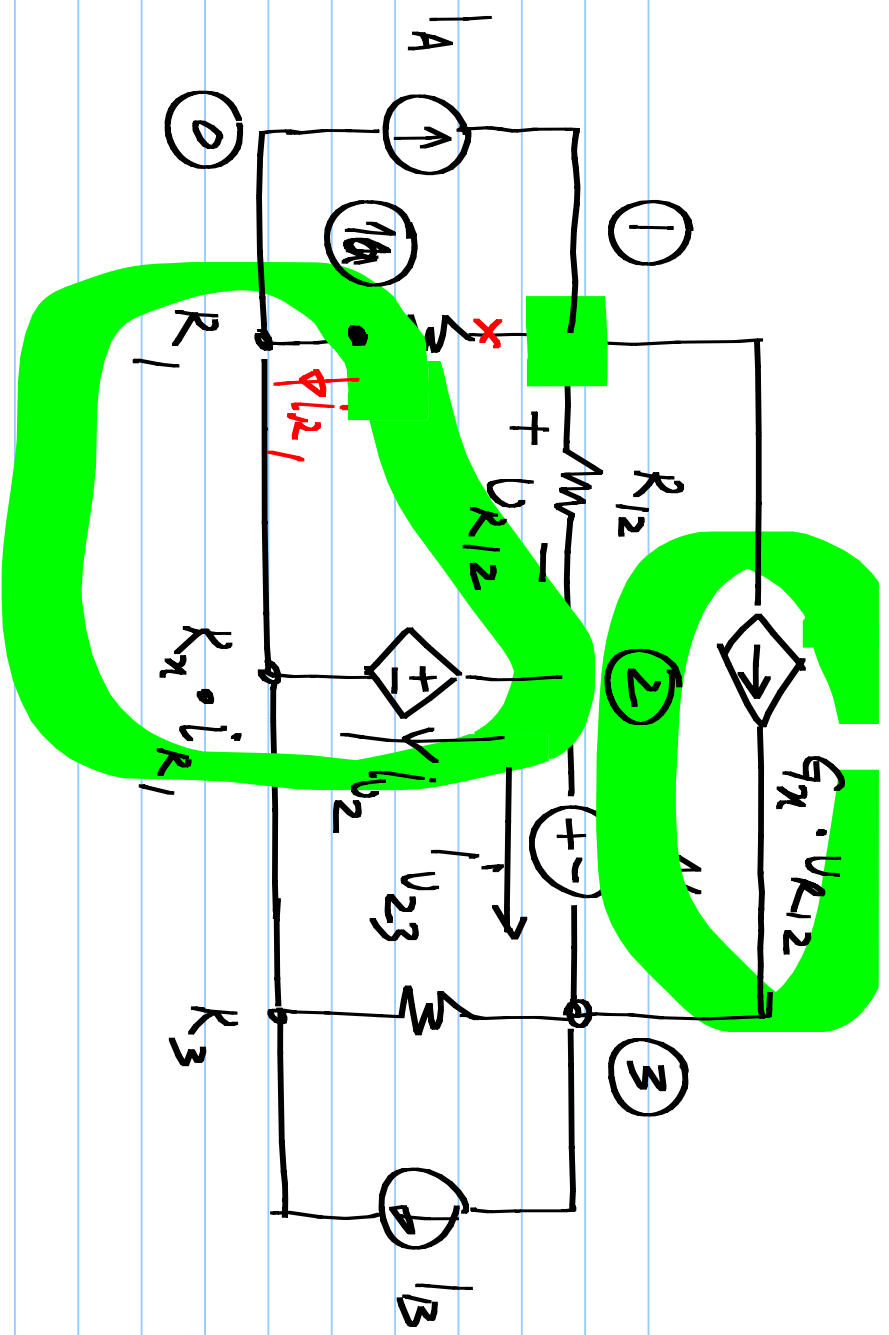
$$\text{KCL: } n_d \begin{bmatrix} & \\ & -1 \end{bmatrix} \begin{bmatrix} \\ i_x \end{bmatrix}$$

$$-g v_c + g v_d' + i_x = 0$$

$$\text{KCL } n_d' \begin{bmatrix} -1 \\ i_0 \end{bmatrix} - i_0 + i_x = 0$$

$$\underline{V} =$$

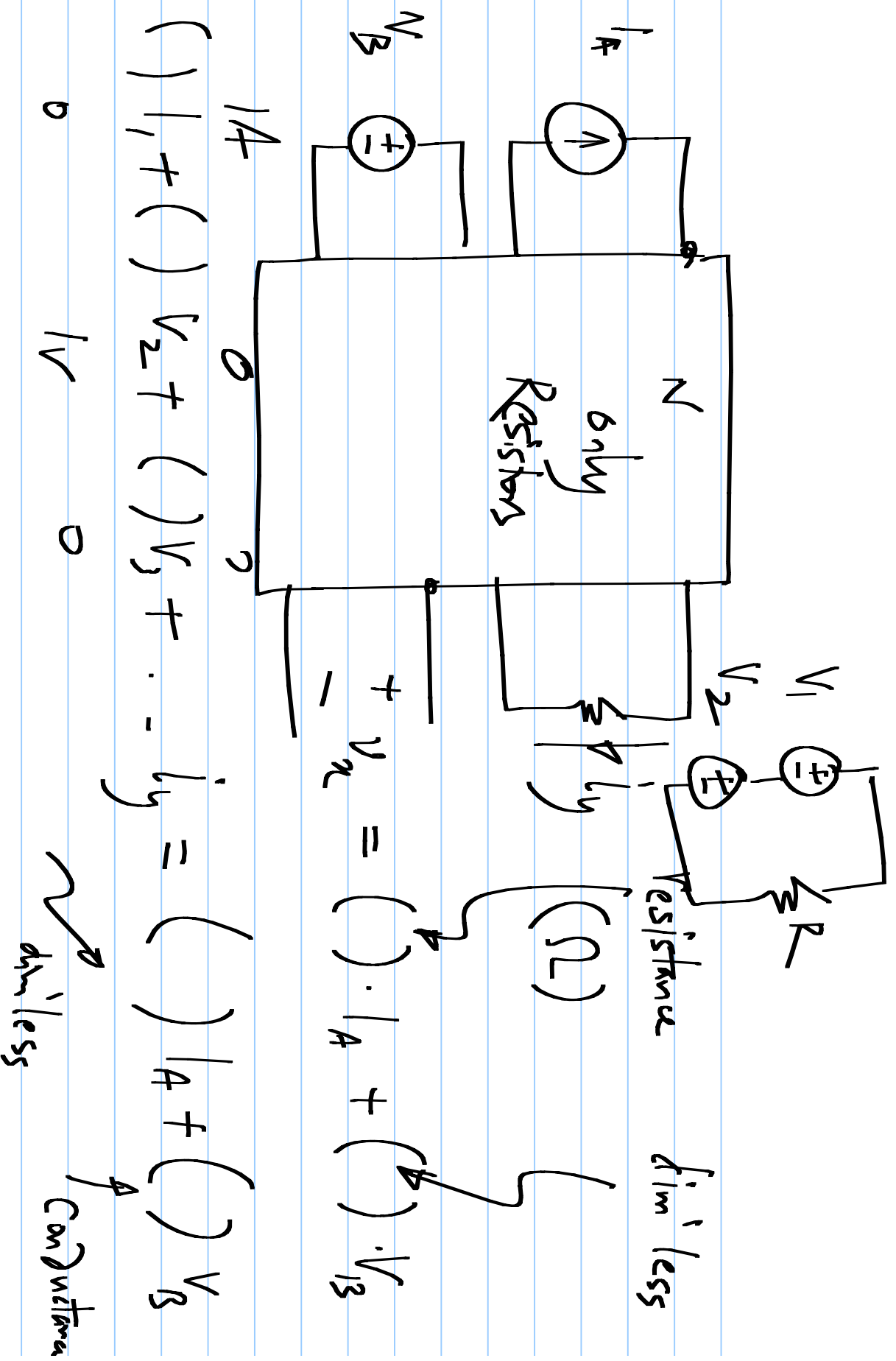
$$\begin{bmatrix} v_1 \\ v_2 \\ v_3 \\ i_{u_2} \\ i_{u_3} \\ i_{R_1} \end{bmatrix}$$

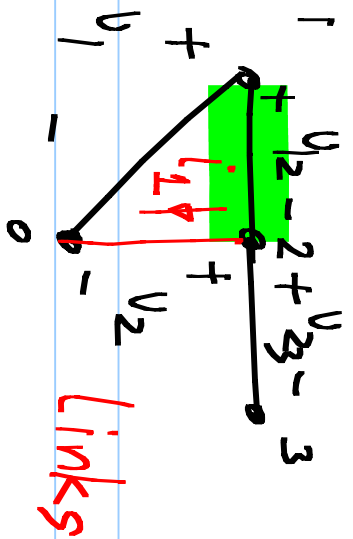
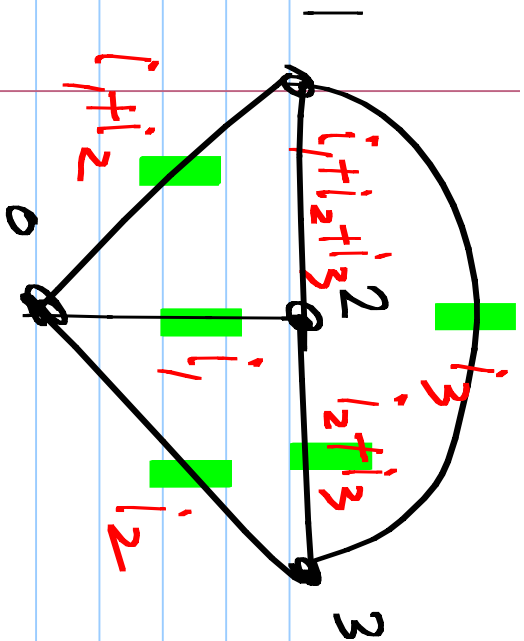


n_1	G_1	$-G_1$	v_1
n_2	$-G_1$	G_1	v_2
n_3	$-G_m$	G_m	v_3
n/a			v/a
v_e			i_{v23}
v_{c1}/s			i_{v2}
$s h_n$			i_{R1}

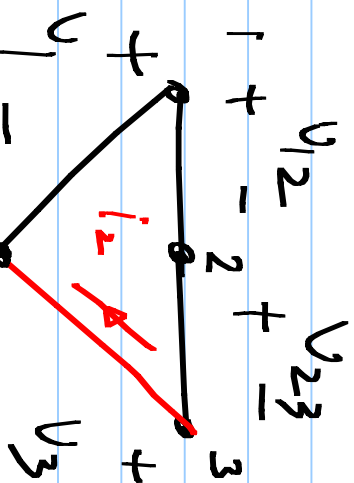
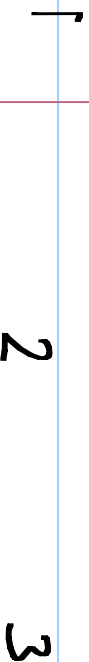
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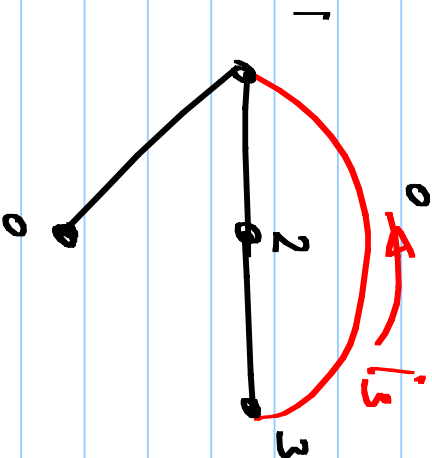




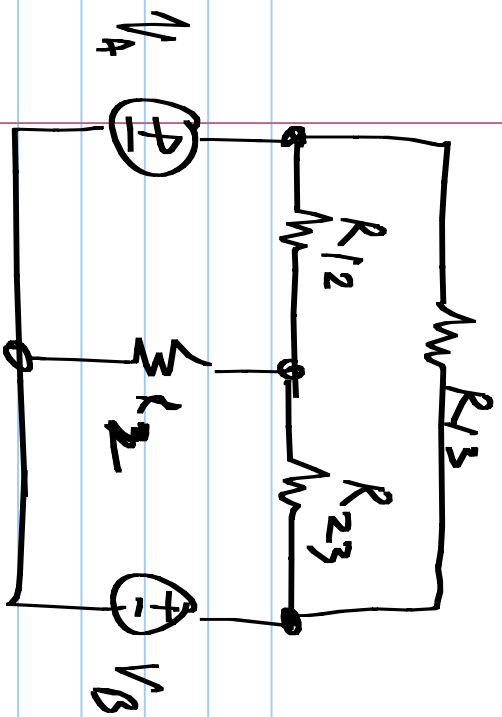
$$v_{12} + v_2 - v_1 = 0$$



$$v_{12} + v_{23} + v_3 - v_1 = 0$$



$$v_{12} + v_{23} - v_{13} = 0$$



$$\text{Loop \#1: } v_{12} + v_{23} - v_1 = 0$$

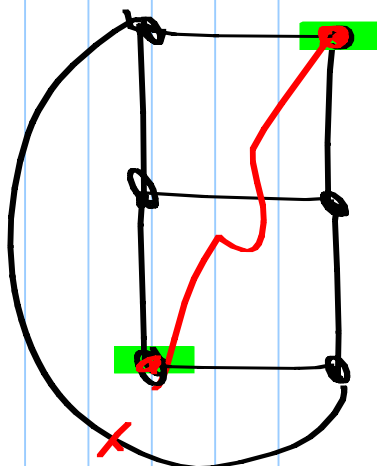
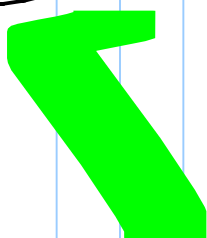
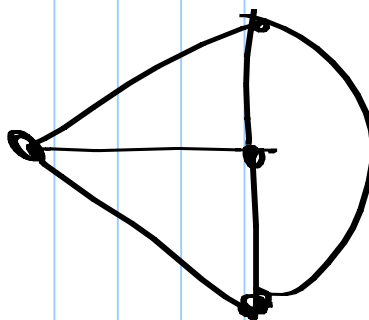
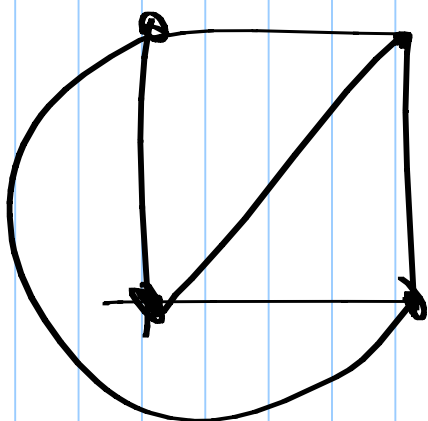
$$R_{12}(i_1 + i_2 + i_3) + R_2 i_1 = V_A$$

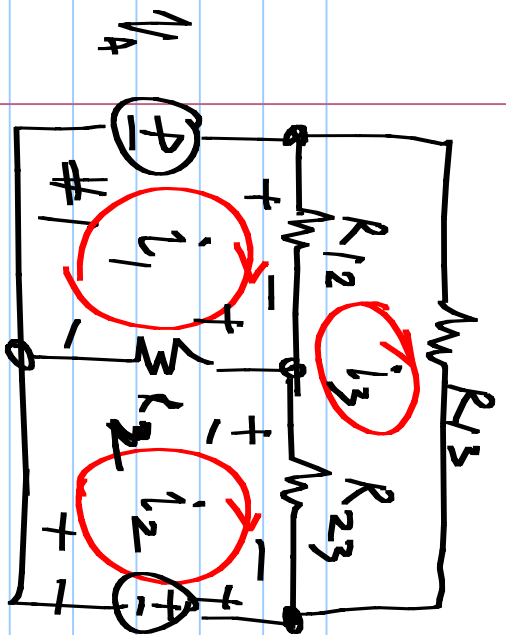
$$\text{Loop \#2: } v_{12} + v_{23} + v_3 - v_1 = 0$$

$$R_{12}(i_1 + i_2 + i_3) + R_{23}(i_2 + i_3) = -V_B + V_A$$

$$\text{Loop \#3: } v_{12} + v_{23} - v_3 = 0$$

$$R_{12}(i_1 + i_2 + i_3) + R_{23}(i_2 + i_3) + R_{13}(i_3) = 0$$





Meshes

$$\#1 \quad R_{12}(i_1 - i_3) + R_2 \cdot (i_1 - i_2) = V_A$$

$$\#2 \quad R_{23}(i_2 - i_3) + R_2(i_2 - i_1) = -V_B$$

$$\#3 \quad R_{13} \cdot i_3 + R_{23}(i_3 - i_2) + R_{12}(i_3 - i_1) = 0$$

$$\begin{bmatrix} R_{12} + R_2 & -R_2 & -R_{12} \\ -R_2 & R_2 + R_{23} & -R_{23} \\ -R_{12} & -R_{23} & R_{13} + R_{12} + R_{23} \end{bmatrix} \begin{bmatrix} i_1 \\ i_2 \\ i_3 \end{bmatrix} = \begin{bmatrix} V_A \\ -V_B \\ 0 \end{bmatrix}$$