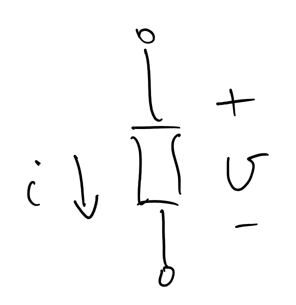
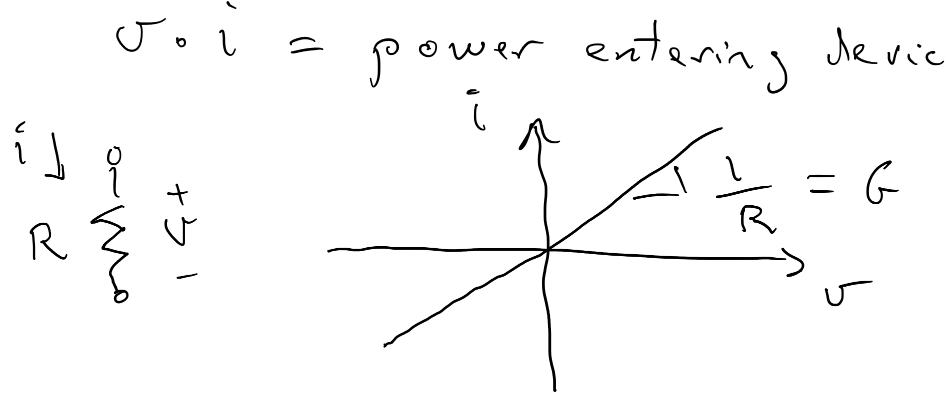
Quick ckts review

Tuesday, January 21, 2020 11:08 AM

Element

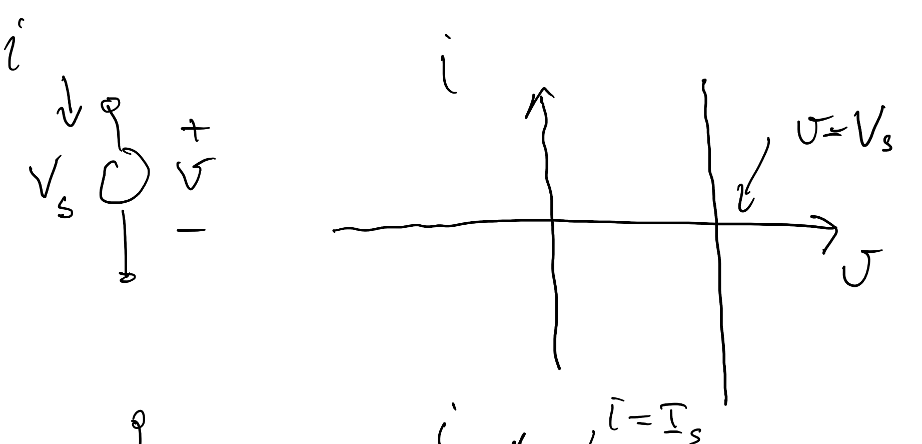


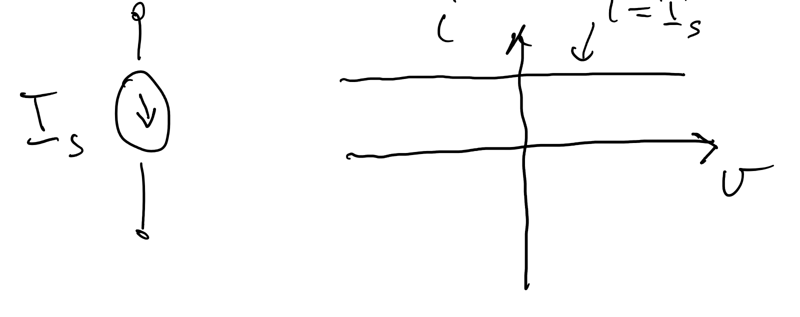
$v \cdot i$ = power entering device



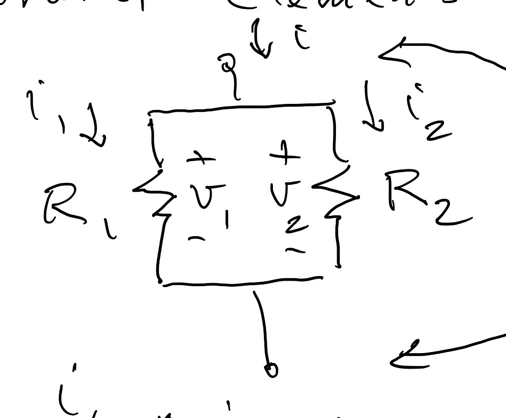
$G = \frac{1}{R}$ $v = Ri$

$i = Gv$

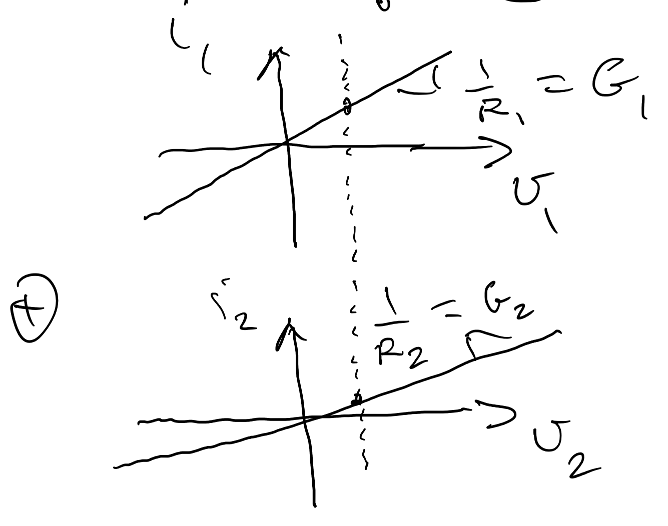


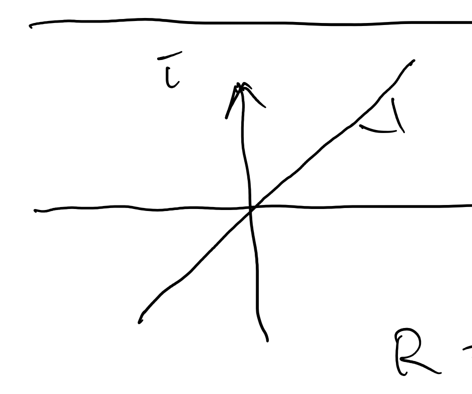


Parallel elements



$v = v_1 = v_2$





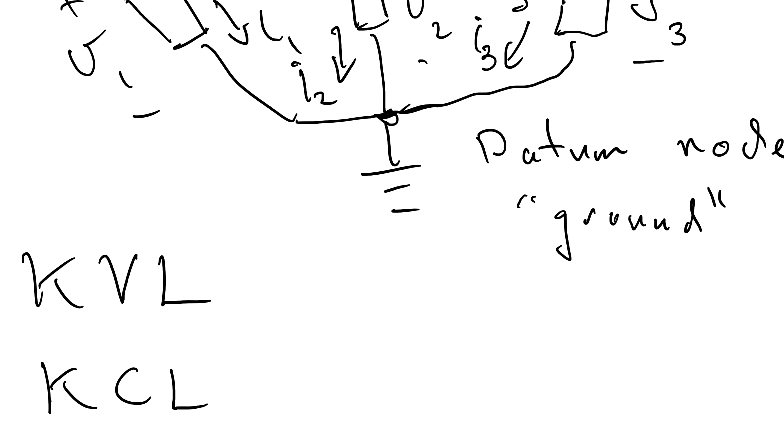
$\frac{1}{R_1} + \frac{1}{R_2} = G_1 + G_2$

Ω^{-1}

℧

$R = \frac{R_1 R_2}{R_1 + R_2}$

More General Ckt - Node Analysis



KVL

KCL

element const. relationships

Know e_1, e_2, e_3

$\Rightarrow$ Know all br voltages

Node eq's $\Leftrightarrow$ KCL

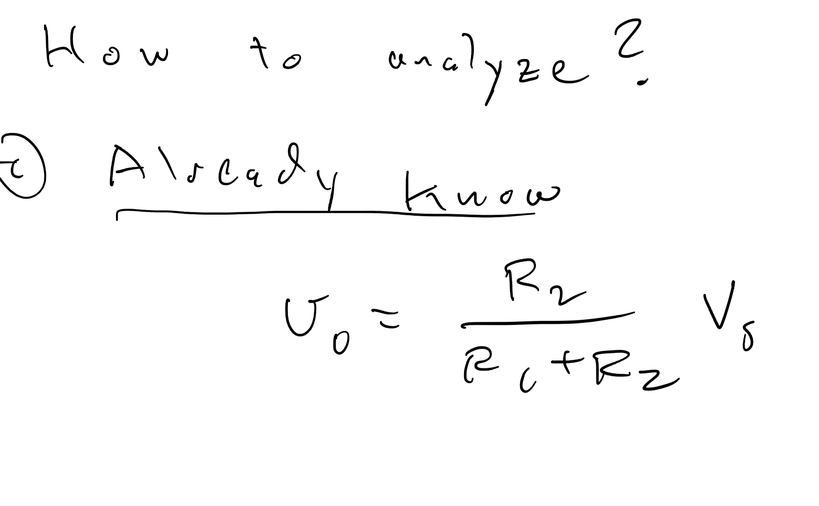
Write sum of currents leaving each node

(1) $i_1 \quad - i_4 = 0$

(2) $i_2 \quad + i_4 - i_5 = 0$

(3) $i_3 \quad + i_5 = 0$

$$\begin{bmatrix} \end{bmatrix} \begin{bmatrix} \end{bmatrix} = 0$$

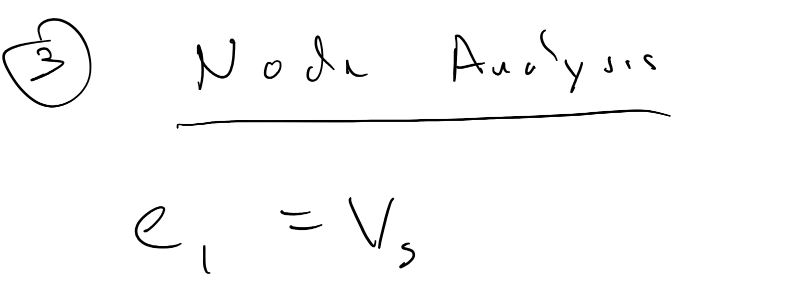


How to analyze?

(1) Already know

$$v_0 = \frac{R_2}{R_1 + R_2} V_s$$

(2) Norton / Thev eq.



$$v_0 = \frac{V_s}{R_1} \cdot \frac{R_1 R_2}{R_1 + R_2} = \ldots$$

(3) Node Analysis

$e_1 = V_s$

1 node eqn:

$$\frac{e_2}{R_2} + \frac{-V_s + e_2}{R_1} = 0$$

$e_2 = \ldots$ ✓

$v_0 = e_2$

Eigenvalues: ← eigenwert

"self" self − value

$A\vec{v} = \lambda\vec{v} \Rightarrow A\vec{v} - \lambda\vec{v} = 0$

A: n×n, λ: scalar

$(A - \lambda I)\vec{v} = 0$ ($A - \lambda I$: n×n)

For λ to be an evector $A - \lambda I$ must have a nontrivial null space, i.e., $\det(A - \lambda I) = 0$

$$A = \begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$$

$\lambda_1 = 2$, $\lambda_2 = 3$

Show this and find $\vec{v}_1$ and $\vec{v}_2$.