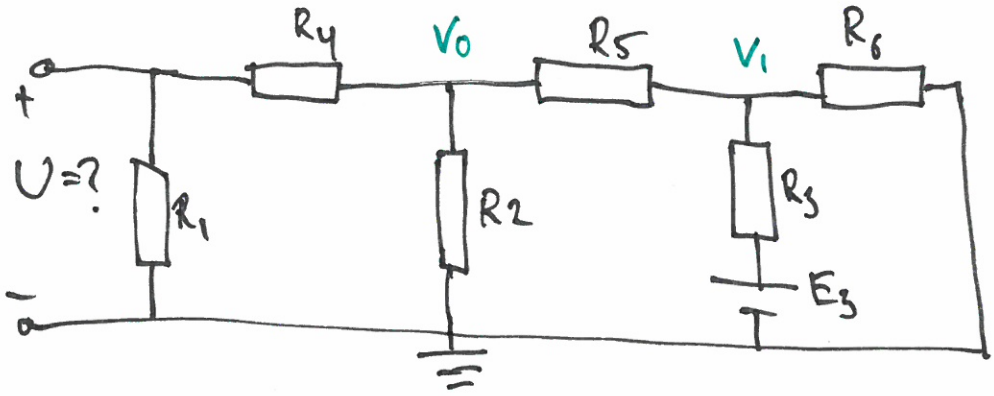
A 1.15) Fall 1: Lösning m. nodanalys

$E_3 = 66\,V$
$R_1 = 300\,\Omega$
$R_2 = 400\,\Omega$
$R_3 = 500\,\Omega$
$R_4 = 100\,\Omega$
$R_5 = 100\,\Omega$
$R_6 = 500\,\Omega$



$$\begin{cases} \frac{-V_0}{R_1+R_4} + \frac{-V_0}{R_2} + \frac{V_1-V_0}{R_5} = 0 \\ \frac{V_0-V_1}{R_5} + \frac{E_3-V_1}{R_3} + \frac{-V_1}{R_6} = 0 \end{cases}$$

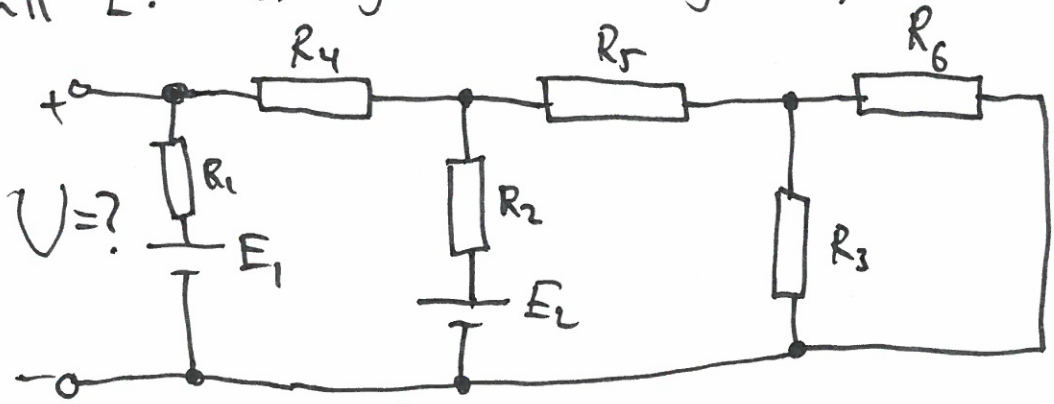
$$\begin{cases} \left(\frac{-1}{R_1+R_4} - \frac{1}{R_2} - \frac{1}{R_5}\right)\cdot V_0 + \frac{1}{R_5}\cdot V_1 = 0 \\ \frac{1}{R_5}\cdot V_0 + \left(\frac{-1}{R_5} - \frac{1}{R_3} - \frac{1}{R_6}\right)\cdot V_1 = \frac{-E_3}{R_3} \end{cases}$$

$$\begin{cases} \frac{-3}{200}\cdot V_0 + \frac{2}{200}\cdot V_1 = 0 \\ \frac{2}{200}\cdot V_0 - \frac{2.8}{200}\cdot V_1 = \frac{-66}{500} \end{cases} \Rightarrow \begin{matrix} V_0 = 12\,V \\ V_1 = 18\,V \end{matrix}$$

$$U = \frac{V_0 \cdot R_1}{R_1 + R_4} = \frac{12 \cdot 300}{300 + 100} = 9\,V$$

(fall 1)
$U = 9\,V$

Fall 2: Lösning med slinganalys



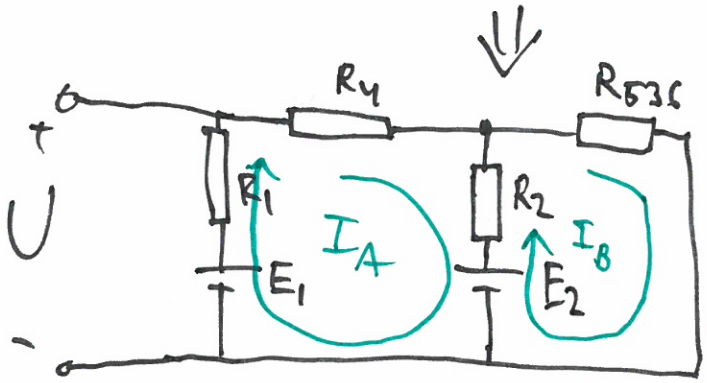
$E_1 = E_2 = 66\ V$

$R_1 = 300\ \Omega$

$R_2 = 400\ \Omega$

$R_3 = R_6 = 500\ \Omega$

$R_4 = R_5 = 100\ \Omega$



$R_{536} = R_5 + R_3 \,//\, R_6$

$= 100 + 250 = 350\ \Omega$

$$\begin{cases} E_1 - R_1 \cdot I_A - R_4 \cdot I_A - R_2 \cdot (I_A - I_B) - E_2 = 0 \\ E_2 - R_2 (I_B - I_A) - R_{536} \cdot I_B = 0 \end{cases}$$

$\Rightarrow$

$$\begin{cases} (-R_1 - R_4 - R_2) \cdot I_A + R_2 \cdot I_B = E_2 - E_1 \\ R_2 \cdot I_A + (-R_2 - R_{536}) \cdot I_B = -E_2 \end{cases}$$

$$\Rightarrow \begin{bmatrix} -800 & 400 \\ 400 & -750 \end{bmatrix} \cdot \begin{bmatrix} I_A \\ I_B \end{bmatrix} = \begin{bmatrix} 0 \\ -66 \end{bmatrix} \Rightarrow \begin{matrix} I_A = 60\ mA \\ I_B = 120\ mA \end{matrix}$$

$$U = E_1 - R_1 \cdot I_A = 66 - 300 \cdot 0.120 = 48\ V$$

(Fall 2)
$U = 48\ V$