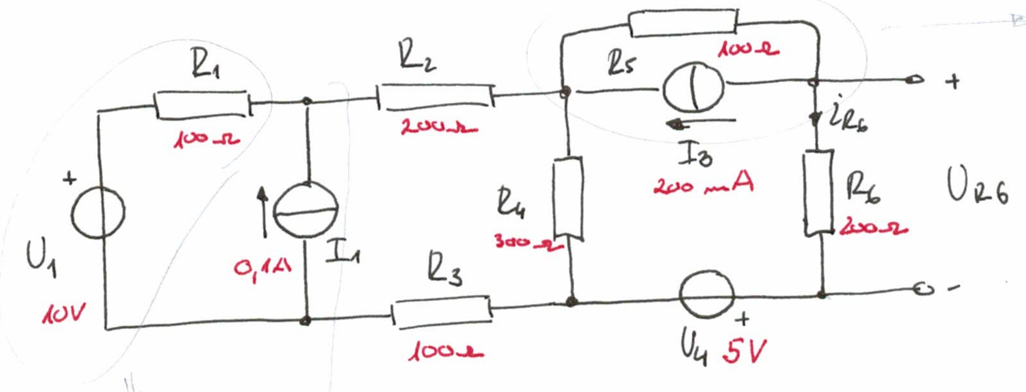
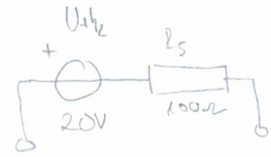
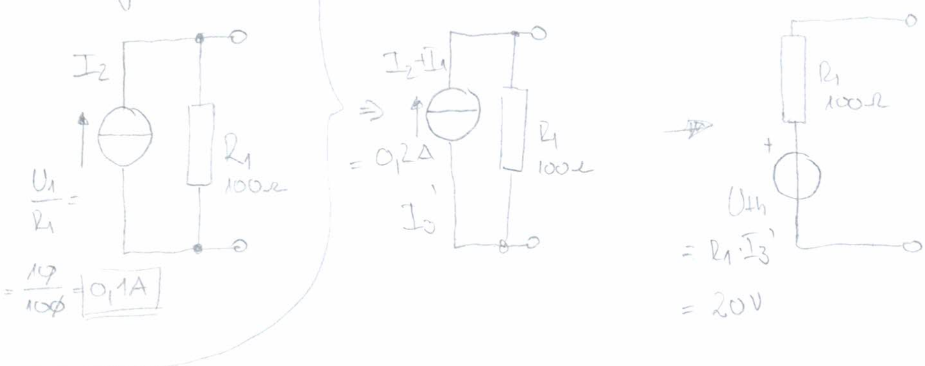
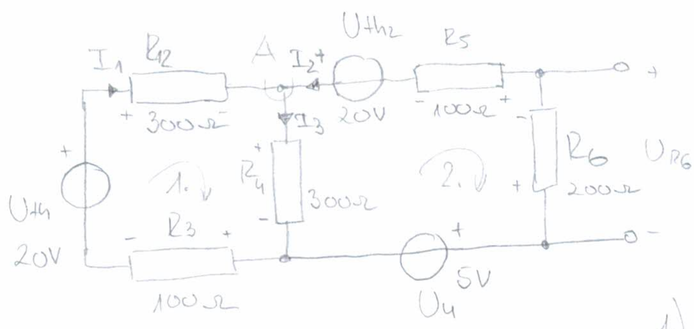
VAJE - PRIMERI ZA KOLOKVIJ 29.10.2012









1.) $-U_{th} + I_1(R_{12}+R_3) + I_3 R_4 = 0$

2.) $U_{th2} - I_2(R_5+R_6) - I_3 R_4 + U_4 = 0$

A:) $I_3 - I_1 - I_2 = 0$

1.) $\Rightarrow I_1 = \dfrac{U_{th} - I_3 R_4}{R_{12}+R_3} = 18{,}18\ mA$

2.) $\Rightarrow I_2 = \dfrac{U_{th2}+U_4 - I_3 R_4}{R_5+R_6} = 34{,}85\ mA = I_{R6}$

$$I_3 - \left(\frac{U_{th} - I_3R_4}{R_{12}+R_3}\right) - \left(\frac{U_{th2}+U_4 - I_3R_4}{R_5+R_6}\right) = 0$$

$$I_3\underbrace{\left(1 + \frac{R_4}{R_{12}+R_3} + \frac{R_4}{R_5+R_6}\right)}_{2,75} = \underbrace{\frac{U_{th}}{R_{12}+R_3} + \frac{U_{th}+U_4}{R_5+R_6}}_{0,1\overline{33}}$$

$I_3 = 48{,}49\ mA$

$U_{R6} = I_2 \cdot R_6 = 34{,}85\ mA \cdot 200\ \Omega = 6{,}97\ V$

$= -6{,}97\ V$

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$P_{R6} = I_{R6} \cdot U_{R6} = 0{,}243\ W$

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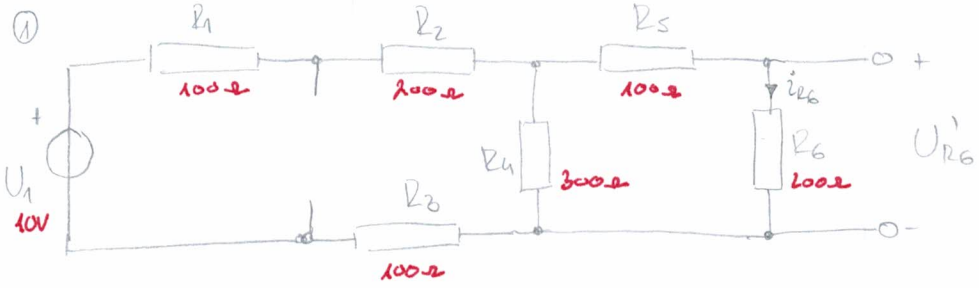
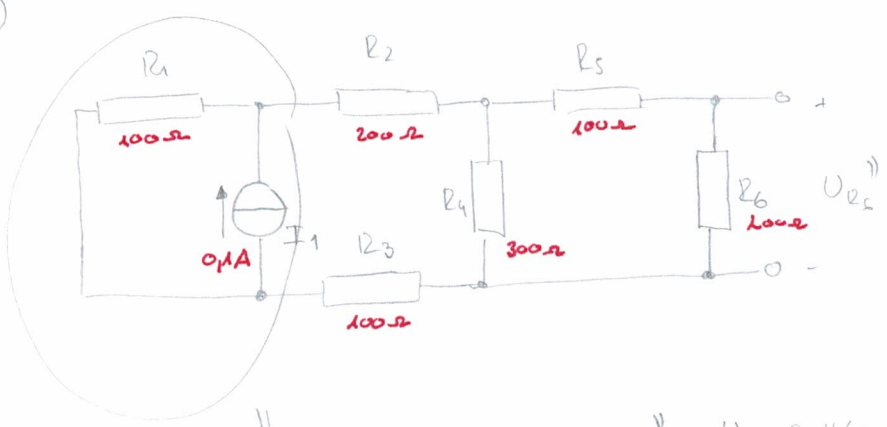
①

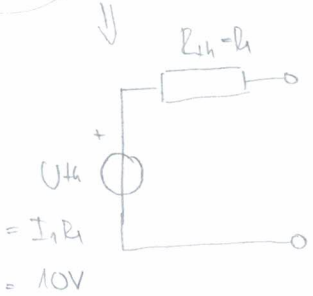


$$U'_{R6} = \frac{U_1 \cdot R_4 \| (R_5+R_6) \cdot R_6}{(R_1+R_2+R_3+R_4 \| (R_5+R_6)) \cdot (R_5+R_6)} = \frac{10V \cdot 150\Omega \cdot 200\Omega}{550\Omega \cdot 300\Omega} = \boxed{1,82\ V}$$

②

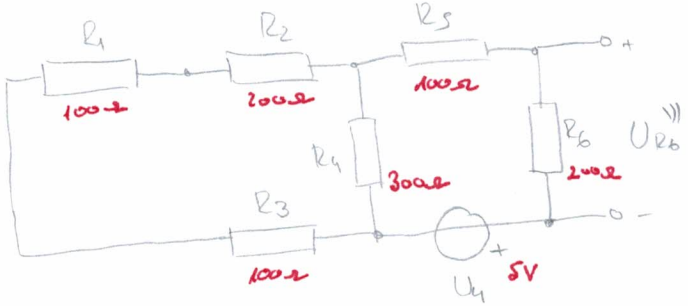


⇓



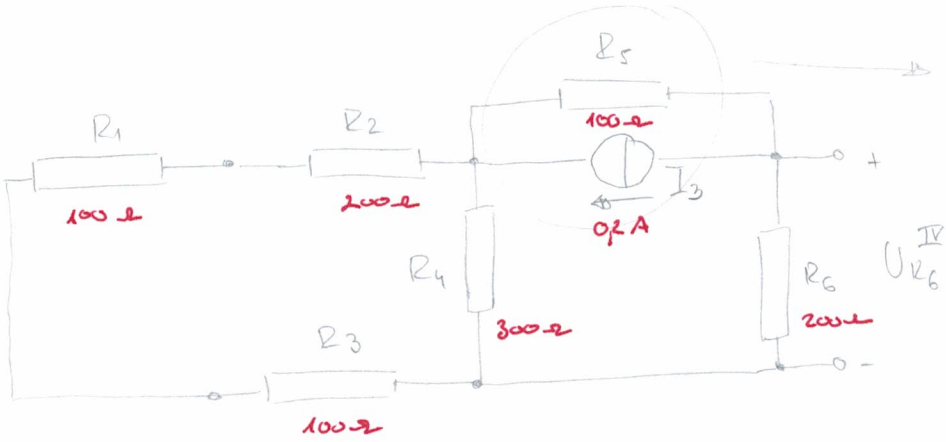
$$U''_{R6} = \frac{U_{Th} \cdot R_4 \| (R_5+R_6) \cdot R_6}{R_1+R_2+R_3+R_4 \| (R_5+R_6)} = \boxed{1,82\ V}$$

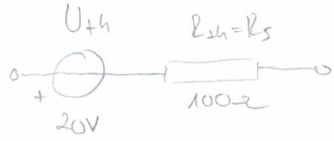
③



$$U'''_{R6} = \frac{-U_4 \cdot R_6}{(R_1+R_2+R_3) \| R_4 + R_5 + R_6} = \boxed{-2,12\ V}$$

(4)





$$U_{R6}^{IV} = \frac{-U_{th} \cdot R_6}{(R_1+R_2+R_3)\|R_4 + R_5 + R_6} = \boxed{-8{,}49\ V}$$

$$U_{R6} = U_{R6}' + U_{R6}'' + U_{R6}''' + U_{R6}^{IV}$$

$$= 1{,}82V + 1{,}82V - 2{,}12V - 8{,}49V$$

$$= \boxed{-6{,}97V} \qquad I_{R6} = \frac{U_{R6}}{R_6} = \boxed{34{,}85\ mA}$$

$$P_{R6} = I_{R6} \cdot U_{R6} = \boxed{0{,}243\ W}$$

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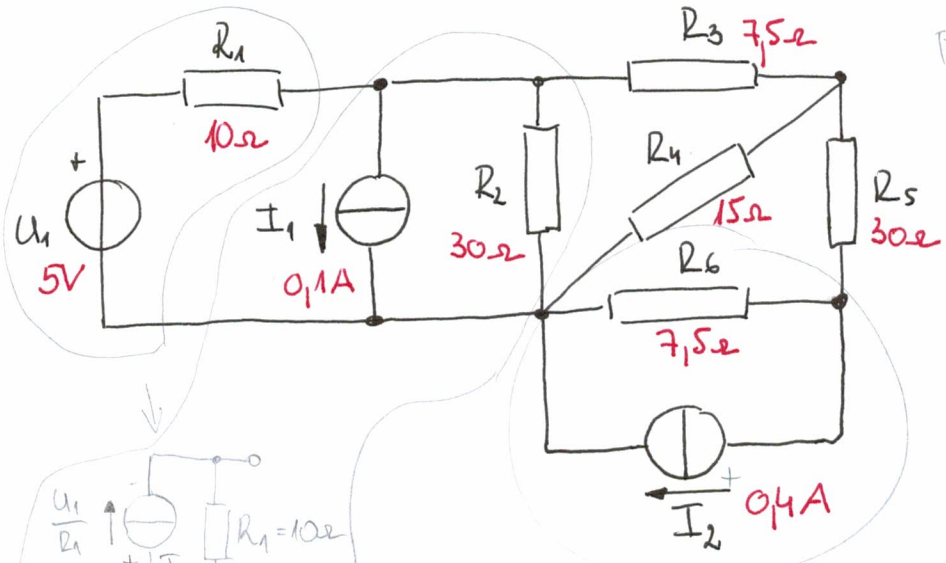
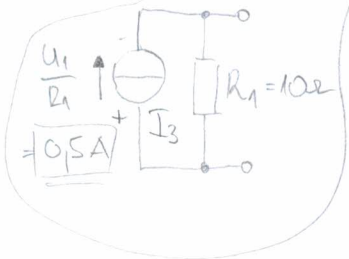
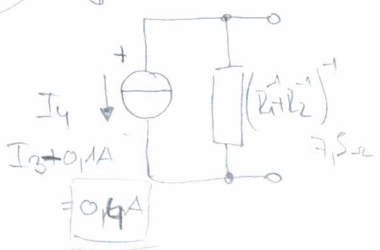
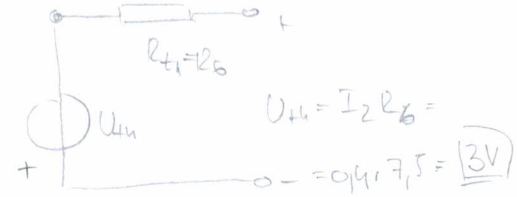
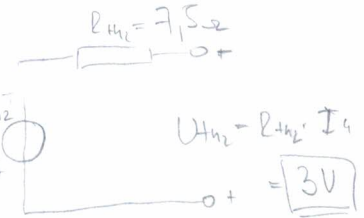
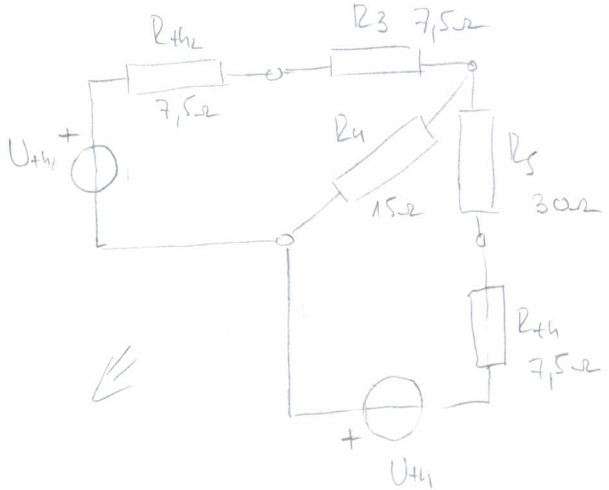


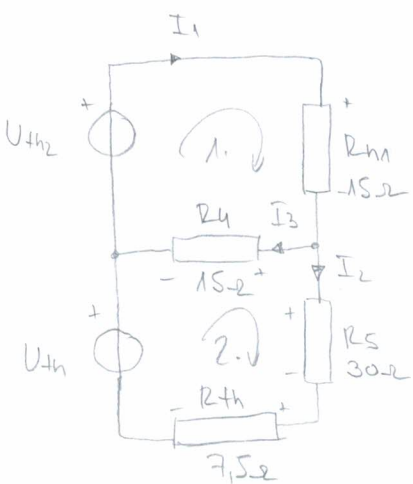












1.) $-U_{th2} + I_1 R_{n1} + I_3 R_4 = 0 \Rightarrow I_1 = \frac{U_{th2} - I_3 R_4}{R_{n1}} = 0{,}15A$

2.) $-U_{th} + I_2 (R_5 + R_{th}) - I_3 R_4 = 0 \Rightarrow I_2 = \frac{+U_{th} + I_3 R_4}{R_5 + R_{th}} = 0{,}1A$

A:) $I_2 - I_1 + I_3 = 0$

$U_{R5} = R_5 \cdot I_2 =$

$30\Omega \cdot 0{,}1A = 3V$

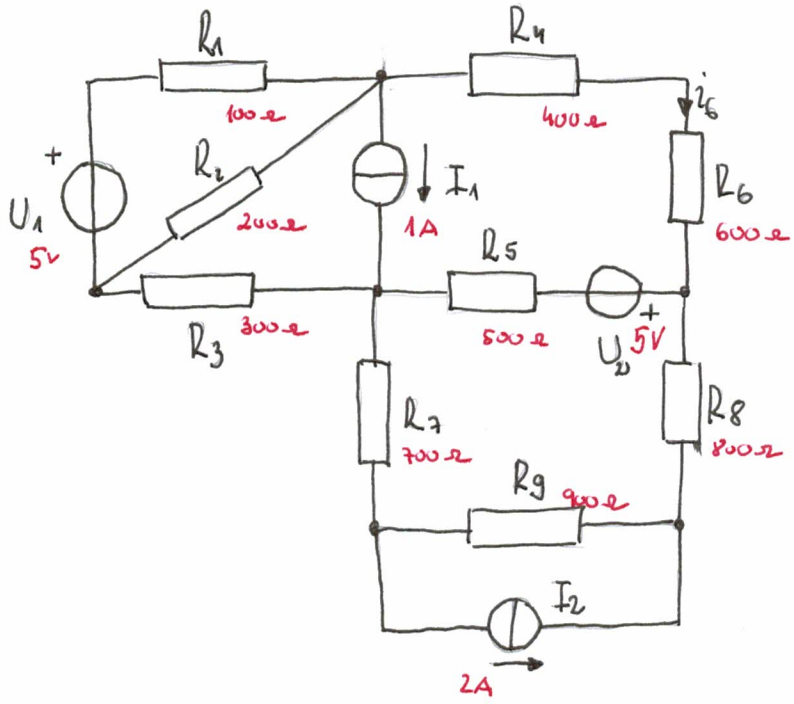
$P_{R5} = U_{R5} \cdot I_2 =$

$= 3V \cdot 0{,}1A = 0{,}3W$

$$\frac{+U_{th} + I_3 R_4}{R_5 + R_{th}} + \frac{-U_{th2} + I_3 R_4}{R_{n1}} - I_3 = 0$$

$$I_3 \left(\underbrace{+\frac{R_4}{R_5 + R_{th}} + \frac{R_4}{R_{n1}} + 1}_{2,4} \right) = \underbrace{\frac{+U_{th2}}{R_{n1}} - \frac{U_{th}}{R_5 + R_{th}}}_{0,12}$$

$I_3 = 0{,}05A$

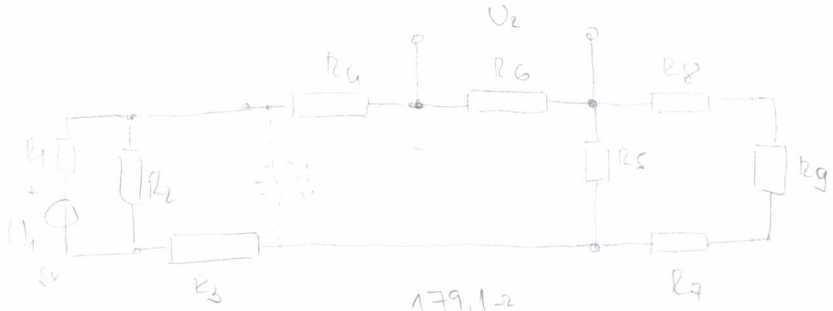


$i_6 = ?$

$U_{R_6} = ?$

$P_{R_6} = ?$

U_2'



179,1Ω

2400

600Ω

$$U_2' = \frac{U_1 \cdot R_2 \| \left(R_4 + R_6 + R_3 + R_5 \| (R_8 + R_7 + R_9)\right) \cdot R_6}{R_1 + \left(R_2 \| \left(R_4 + R_6 + R_3 + R_5 \| (R_8 + R_7 + R_9)\right)\right) \cdot \left(R_4 + R_6 + R_3 + R_5 \| (R_8 + R_7 + R_9)\right)} = \boxed{1{,}123\,V}$$

2400

413,79

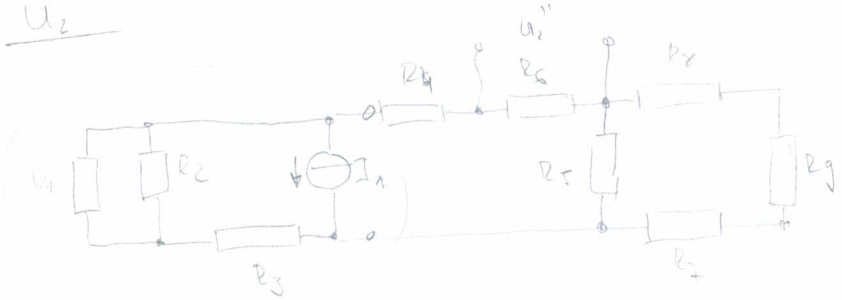
1713,79

179,1

279,1

1713,79Ω

U_2''



$U_{th} = R_{th} \cdot I_1$

$= 366{,}67\,V$

$R_{th} = R_3 + R_1 \| R_2$

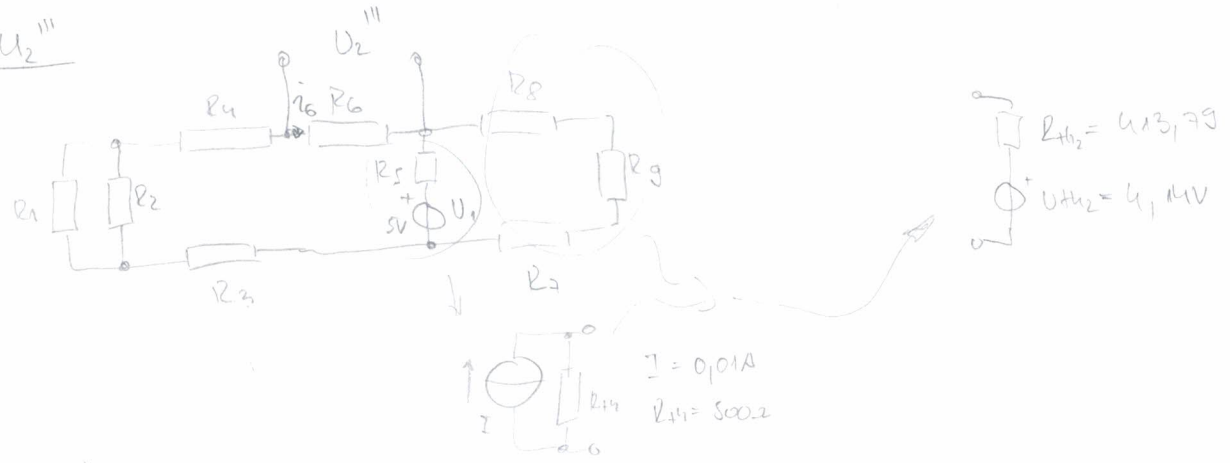
$= 366{,}67\,\Omega$

$$U_2'' = \frac{-U_{th} \cdot R_6}{R_{th} + R_4 + R_6 + R_5 \| (R_7 + R_8 + R_9)} \quad \boxed{-123{,}56\,V}$$

413,79

1780,45Ω

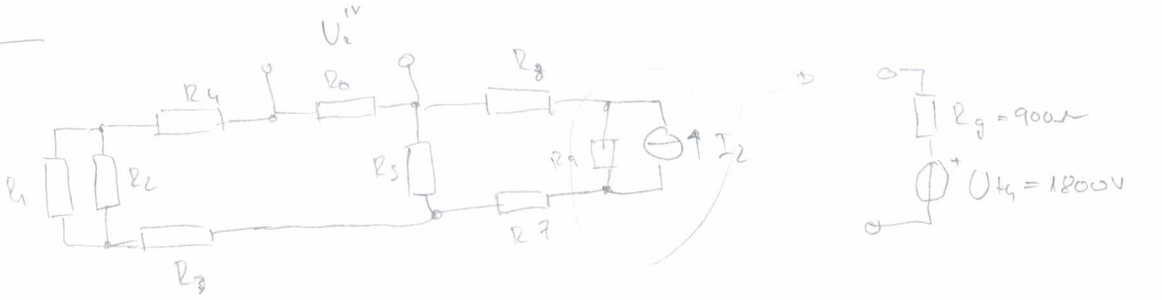
U_2^{III}



$$U_2^{III} = \frac{-U_{th2} \cdot R_6}{R_{th2} + R_6 + R_4 + R_3 + R_1 \| R_2} = \boxed{-1,39\,V}$$

$R_{th2} + R_6 + R_4 + R_3 + R_1 \| R_2 = 1780,493\,\Omega$

U_2^{IV}



$$U_2^{IV} = \frac{U_{th} \cdot \overbrace{R_5 \| (R_1 \| R_2 + R_3 + R_4 + R_6)}^{366,07} \cdot R_6}{\underbrace{((R_1 \| R_2 + R_3 + R_4 + R_6) \| R_5}_{366,07} + \underbrace{R_8 + R_7 + R_9}_{2400}) \cdot \underbrace{(R_6 + R_4 + R_3 + R_1 \| R_2)}_{1366,67}} = \boxed{-104,58\,V}$$

$1366,67$

$366,07$

$2766,07\,\Omega$

$$U_{R6} = U_2' + U_2'' + U_2^{III} + U_2^{IV} =$$

$$= 1,123V - 123,56\,V - 1,39\,V - 104,58V =$$

$$= \boxed{-228,407V}$$

$$P_{R6} = i_{R6} \cdot U_{R6} = \boxed{85,95\,W}$$

$$i_{R6} = \frac{U_{R6}}{R_6} = \boxed{-0,381\,A}$$