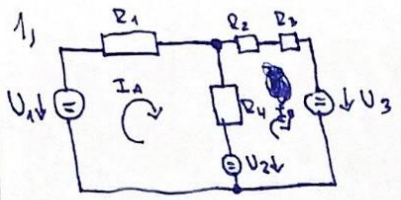
1)



I_A

$0 = -U_1 + U_{R3} + U_{R4} + U_2$

$0 = -U_1 + I_A \cdot R_1 + I_1 \cdot R_4 + U_2 - I_B \cdot R_4$

$0 = -40 + 100 I_A + 200 I_A + 20 - 200 I_B$

$20 = 300 I_A - 200 I_B$

$I_A = \frac{200 I_B + 20}{300}$

I_B

$0 = U_3 - U_2 - 200 \cdot I_B - 50 \cdot I_B - 50 \cdot I_B + 200 I_A$

$-10 = -300 I_B + 200 I_A$

$-10 = -300 I_B + \frac{400 I_B + 40}{3} \quad | \cdot 3$

$-30 = -900 I_B + 400 I_B + 40$

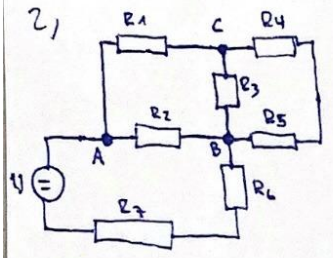
$-70 = -500 I_B$

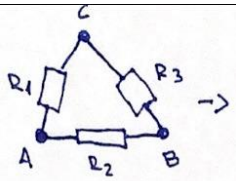
$I_B = 0{,}14\,A$

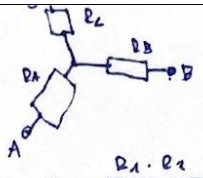
$I_A = \frac{28 + 20}{300} = 0{,}16\,A$

$I_{R1} = I_A$

2)







$$R_A = \frac{R_1 \cdot R_2}{R_1+R_2+R_3} = \frac{5000}{250} = 20\,\Omega$$

$$R_B = \frac{R_2 \cdot R_3}{R_1+R_2+R_3} = \frac{10\,000}{250} = 40\,\Omega$$

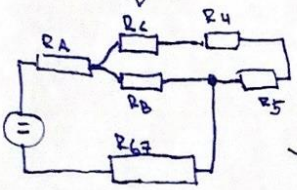
$$R_C = \frac{R_1 \cdot R_3}{R_1+R_2+R_3} = \frac{5000}{250} = 25\,\Omega$$

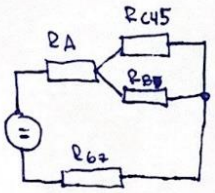
$$R_{67} = R_6 + R_7 = 50\,\Omega$$

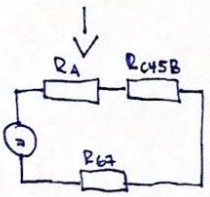
$$R_{C4} = R_C + R_4 = 75\,\Omega$$

$$R_{C45} = R_{C4} + R_5 = 125\,\Omega$$

$$R_{C45B} = \frac{R_{C45} \cdot R_B}{R_{C45}+R_B} = \frac{5000}{125+40} = 30{,}\overline{30}\,\Omega$$

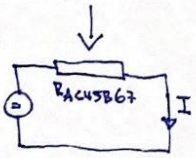






$$R_{AC45B67} = R_A + R_{C45B} + R_{67} = 20 + 30{,}30 + 50$$

$$R_{ZAST} = 100{,}\overline{30}\,\Omega$$



$$U = R \cdot I$$

$$220 = 100{,}30 \cdot I$$

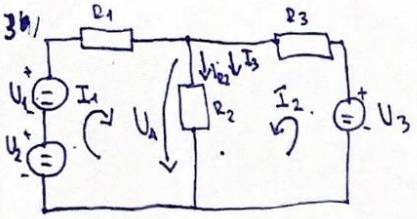
$$I = 2{,}19\ A$$

$$U_{R6} = R_6 \cdot I$$

$$U_{R6} = 25 \cdot 2{,}19$$

$$U_{R6} = 54{,}83\ V$$

3b)



$I_1 + I_2 = I_3$

$$\frac{U_1 + U_2 - U_A}{R_1} + \frac{U_3 - U_A}{R_3} = \frac{U_A}{R_2}$$

$$\frac{40 - U_A}{60} + \frac{40 - U_A}{60} = \frac{U_A}{10} \quad / \cdot 60$$

$$80 - 2U_A = 6U_A$$

$$U_A = 10\,V$$

I_1 ↷

$$0 = U_{R1} + U_A - U_1 - U_2$$

$$0 = I_1 \cdot R_1 + U_A - U_1 - U_2$$

$$I_1 = \frac{U_1 + U_2 - U_A}{R_1}$$

I_2 ↶

$$0 = U_{R3} + U_A - U_3$$

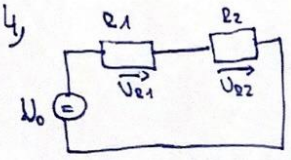
$$0 = I_2 \cdot R_3 + U_A - U_3$$

$$I_2 = \frac{U_3 - U_A}{R_3}$$

$$I_{R3} = \frac{U_3}{R_3 + R_2} = \frac{40}{70} = 0{,}57\,A$$

3)

4)



$U_0 = 300V$

$U_0 = U_{R1} + U_{R2}$

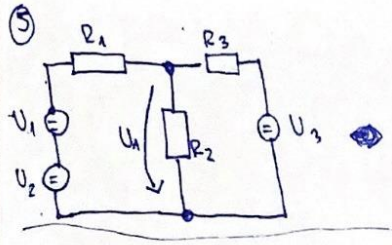
$U_{R2} = 200V$

$$\frac{U_{R1}}{R_1} = \frac{U_{R2}}{R_2}$$

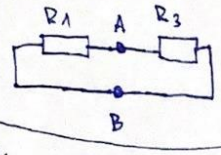
$$\frac{100}{R_1} = \frac{200}{20}$$

$R_1 = 10\Omega$

⑤

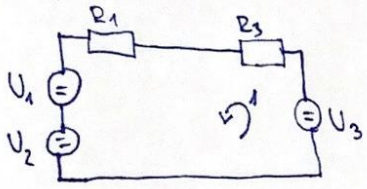


R_i



$$R_i = \frac{R_1 \cdot R_3}{R_1 + R_3} = \frac{3600}{120} = 30\,\Omega$$

U_i



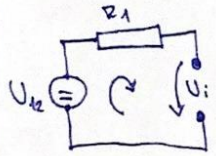
① $R_1 \cdot I_x + R_3 \cdot I_x - U_3 + U_1 + U_2 = 0$

$I_x (R_1 + R_3) = U_3 - U_1 - U_2$

$I_x = \frac{U_3 - U_1 - U_2}{R_1 + R_3}$

$I_x = 0$

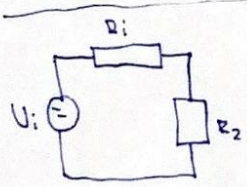
$U_{12} = U_1 + U_2 = 40V$



$0 = -U_{12} + I_x \cdot R_1 + U_i$

$U_i = U_{12} + I_x \cdot R_1$

$U_i = 40V$



$$I_{R2} = \frac{U_i}{R_i + R_2} = \frac{40}{30+10} = 1\,A$$