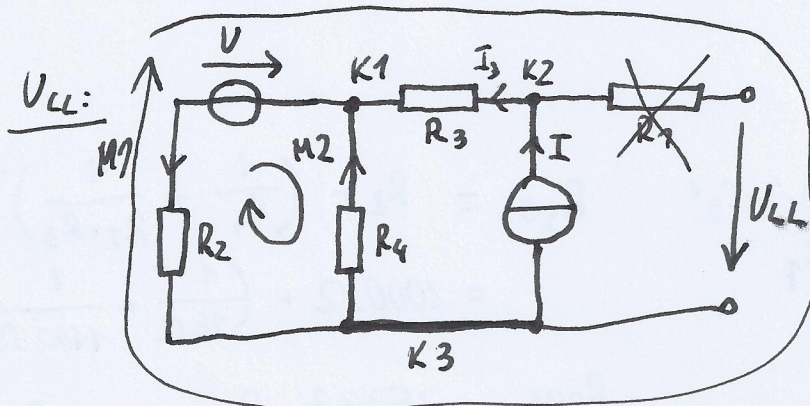
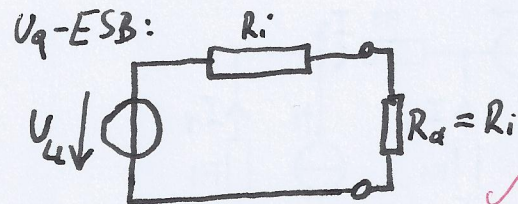
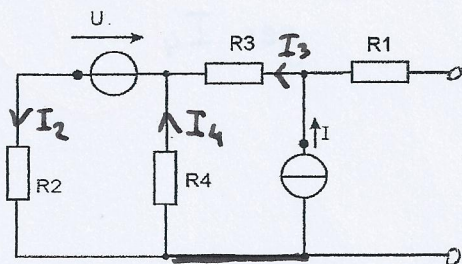


2) a) Berechnen Sie die Größen der Ersatzspannungsquelle!

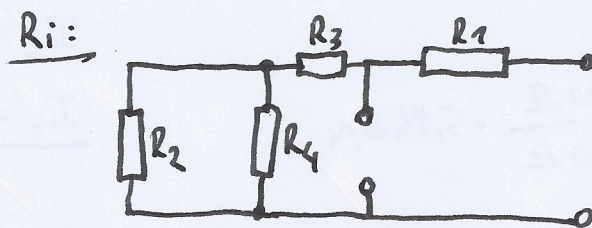
$R_2 = R_4 = 100\Omega$, $R_3 = 220\Omega$, $U_1 = 20V$, $I = 200mA$, $R_1 = 100\Omega$

b) Wie groß muss der Außenwid. sein, damit die Leistung max. wird? Wie groß ist die maximale Leistung?

c) ~~Skizzieren Sie die Kennlinien einer realen Spannungsquelle!~~



$$\begin{aligned} K1: I_3 - I_2 + I_4 &= 0 \\ K2: I_2 - I_4 &= I \\ M1: U - R_3 I_3 - R_2 I_2 &= 0 \\ M2: U - R_4 I_4 - R_2 I_2 &= 0 \\ K1: -I_2 + I_3 + I_4 &= 0 \\ K2: I_2 - I_4 &= 200mA \\ M2: +100I_2 + 100I_4 &= 20V \end{aligned}$$



$$\begin{aligned} R_i &= R_1 + R_3 + \left(\frac{1}{R_2} + \frac{1}{R_4} \right)^{-1} \\ &= 100\Omega + 220\Omega + \left(\frac{1}{100} + \frac{1}{100} \right)^{-1} \\ R_i &= 370\Omega \end{aligned}$$

zu U_{LL} :

$$\begin{aligned} I_2 &= 200mA \\ I_3 &= 200mA \\ I_4 &= 0mA \end{aligned}$$

$$\begin{aligned} M1: U - R_3 I_3 - R_2 I_2 + U_{LL} &= 0 \\ U_{LL} &= R_2 I_2 + R_3 I_3 - U = 100I_2 + 220I_3 - 20V \\ U_{LL} &= 100 \cdot 200mA + 220 \cdot 200mA - 20V = 44V \end{aligned}$$

Maximale Leistung: $R_a = R_i = 370\Omega$

$$P = \frac{U_{LL}^2}{4R_i} = \frac{44^2 V^2}{4 \cdot 370\Omega} = 1,30W$$