1. Falsche Batterie

$$R = 100\ \Omega; \quad R_i = 0.1\ \Omega; \quad U_1 = U_2 = 1.5\ \text{V}$$

a)

$$\boxed{\begin{aligned} M_1: &\quad U_1 - R_i(I_1 + I_2) - U_2 = 0 \\ M_2: &\quad U_1 - R_i I_1 - RI = 0 \\ M_3: &\quad U_2 - R_i I_2 - RI = 0 \\ K_1: &\quad I_1 + I_2 = I \end{aligned}}$$

b)

$$I = \frac{2U_1}{R_i + 2R} = \underline{\underline{14.99\ \text{mA}}}$$
$$U = IR = \underline{\underline{1.499\ \text{V}}}$$
$$P = UI = \underline{\underline{22.48\ \text{mW}}}$$

c) $U_1 = 1.5\ \text{V}; \quad U_2 = 1.2\ \text{V}$

$$I = \frac{U_1 + U_2}{R_i + 2R} = \underline{\underline{13.49\ \text{mA}}}$$
$$U = IR = \underline{\underline{1.349\ \text{V}}}$$
$$P = UI = \underline{\underline{18.21\ \text{mW}}}$$

d)

$$I_1 = \frac{U_1 + U_2}{4R + 2R_i} - \frac{U_2 - U_1}{2R_i} = \underline{\underline{1.51\ \text{A}}}$$
$$I_2 = I - I_1 = \underline{\underline{-1.49\ \text{A}}}$$

2. Umladen von Kondensatoren

a)

3. Wheatstone'sche Brucke

$$R_1 = 17\ \text{k}\Omega; \quad R_2 = 9\ \text{k}\Omega; \quad R_3 = 3.6\ \text{k}\Omega$$

a)

$$U_1 = \frac{R_1}{R_1+R_2} U$$
$$U_2 = \frac{R_x}{R_x+R_3} U$$
$$\Delta U = U_1 - U_2 = \underline{\underline{\left(\frac{R_1}{R_1+R_2} - \frac{R_x}{R_x+R_3}\right) U}}$$

b)

$$0 = U_1 - U_2$$
$$0 = \frac{R_1}{R_1+R_2} - \frac{R_x}{R_x+R_3}$$
$$R_2 = \underline{\underline{\frac{R_1 R_3}{R_x}}}$$

c)

$$R_x = \frac{R_1 R_3}{R_2} = \underline{\underline{6.8\ \text{k}\Omega}}$$