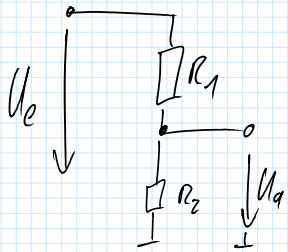
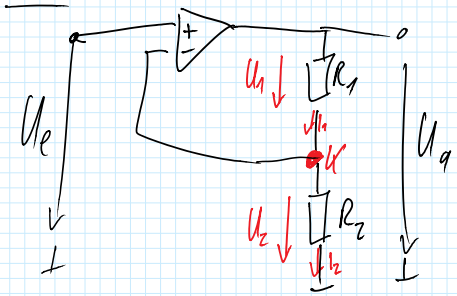
C1.1



$$U_a = \frac{R_2}{R_1 + R_2}$$

C1.2



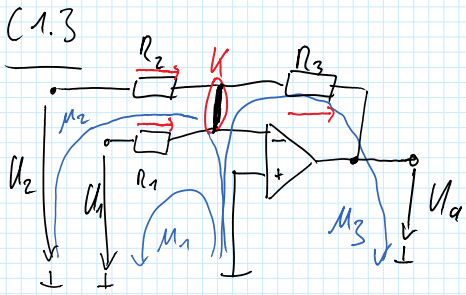
K: $I_1 = I_2 \Rightarrow \frac{U_1}{R_1} = \frac{U_2}{R_2} \quad | U_2 = U_e$

$$\frac{U_1}{R_1} = \frac{U_e}{R_2} \quad | U_1 = U_a - U_e$$

$$\frac{U_a - U_e}{R_1} = \frac{U_e}{R_2} \Rightarrow U_a = \frac{U_e \cdot R_1}{R_2} + U_e$$

$$U_a = \frac{R_1 + R_2}{R_2} U_e = \left(\frac{R_1}{R_2} + 1\right) U_e$$

C1.3



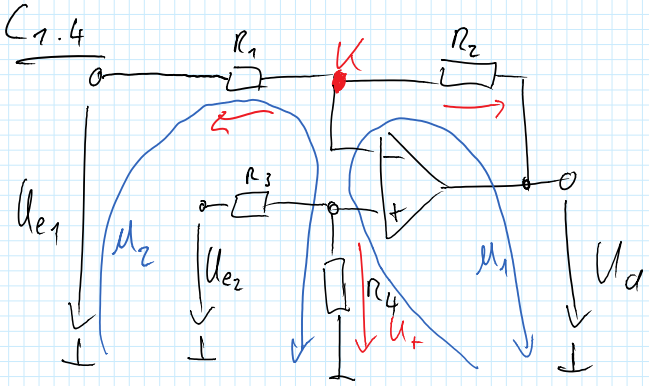
K: $I_{R2} + I_{R1} = I_{R3} \qquad I = \frac{U}{R}$

$$\Rightarrow \frac{U_{R2}}{R_2} + \frac{U_{R1}}{R_1} = \frac{U_{R3}}{R_3} \quad \left| \begin{array}{l} U_1: \\ U_1 = U_{R1} \end{array} \right| \left| \begin{array}{l} U_2: \\ U_2 = U_{R1} \end{array} \right| \left| \begin{array}{l} U_3: \\ U_3 = -U_a \end{array} \right.$$

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

z R_1 R_3

$$U_a = -R_3\left(\frac{U_1}{R_1} + \frac{U_2}{R_2}\right)$$



$$U_+ = \frac{R_4}{R_3+R_4}\,U_{e2}$$

U_1: $-U_+ + U_{R2} + U_a = 0$

U_2: $-U_{e1} - U_{R_1} + U_+ = 0$

K: $-I_{R_1} = I_{R_2} \Rightarrow \frac{U_{R_1}}{R_1} = \frac{U_{R_2}}{R_2}$ | U_1, U_2

$$-\frac{U_+ - U_{e1}}{R_1} = \frac{U_+ - U_a}{R_2}$$

$$(-U_+ + U_{e1})\frac{R_2}{R_1} = U_+ - U_a$$

$$-(-U_+ + U_{e1})\frac{R_2}{R_1} + U_+ = +U_a$$

$$U_+\frac{R_2}{R_1} - U_{e1}\frac{R_2}{R_1} + U_+ = U_a \Rightarrow$$

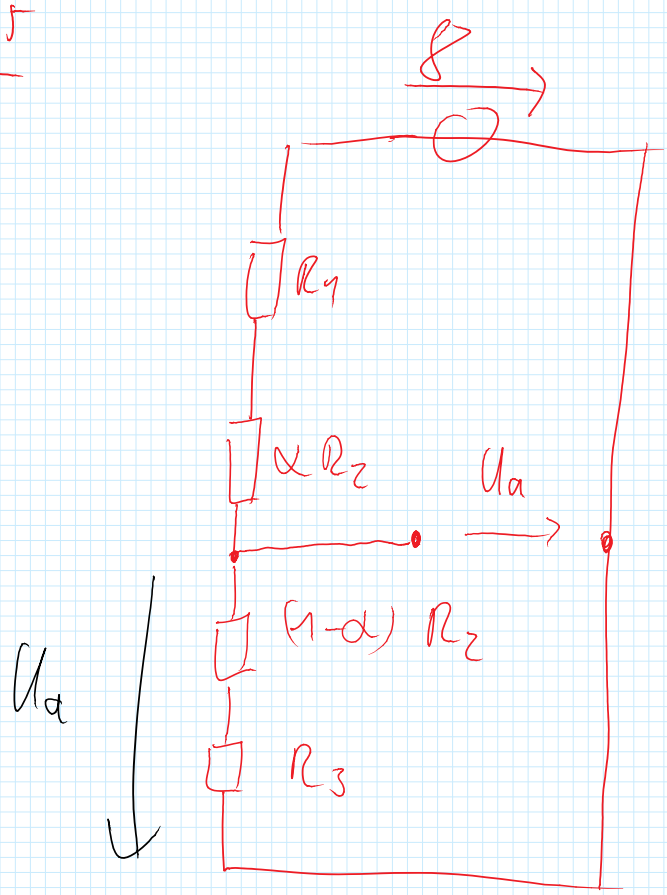
$$\frac{R_2}{R_1}\frac{R_4}{(R_3+R_4)}U_{e2} - \frac{R_2}{R_1}U_{e1} + \frac{R_4}{R_3+R_4}U_{e2} = U_a$$

$$\Rightarrow \frac{R_2 R_4}{R_1(R_3+R_4)} + \frac{R_1 R_4}{R_1(R_3+R_4)}U_{e2} - \frac{R_2}{R_1}U_{e1} = U_a$$

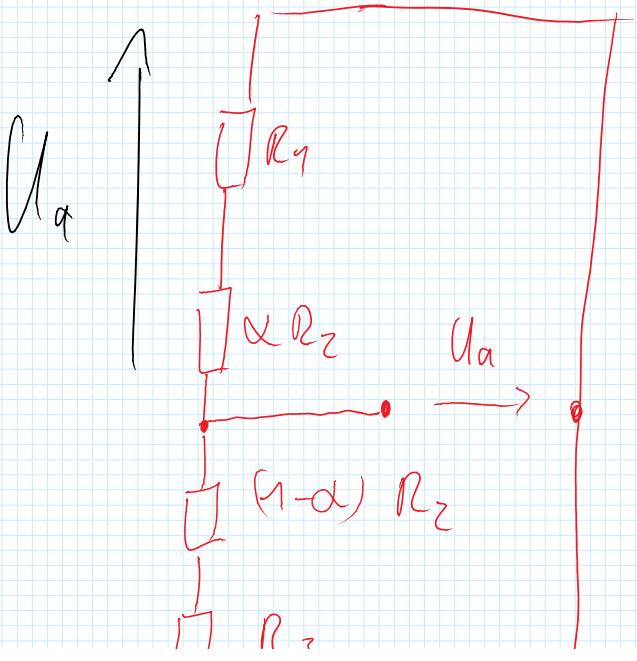
$$\boxed{\frac{R_4}{R_1}\left(\frac{R_2+R_1}{R_3+R_4}\right)U_{e2} - \frac{R_2}{R_1}U_{e1} = U_a}$$

$$R_1 \left| \frac{}{R_3 + R_4} \right| U_{e2} - \frac{R_2}{R_1} U_{e1} = U_a$$

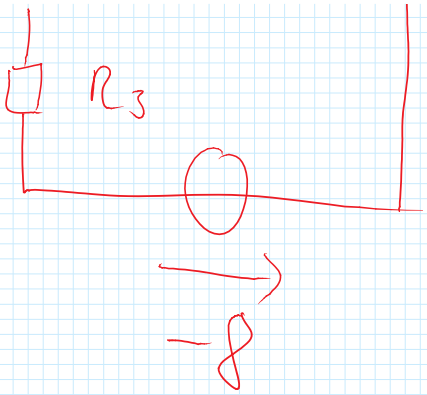
C1.5



$$U_{a1} = \frac{(1-\alpha) R_2 + R_3}{R_1 + R_2 + R_3} \cdot 4\,8\,V$$



$$U_{a2} = \frac{R_1 + \alpha R_2}{R_1 + R_2 + R_3} (-8\,V$$

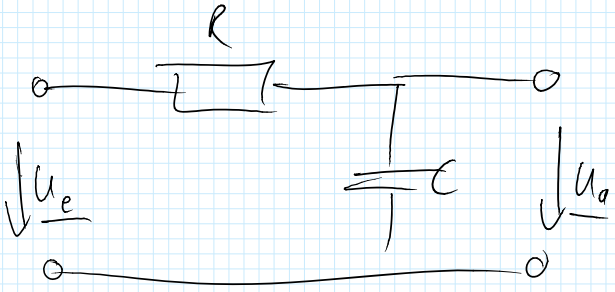


$$U_a = \left(\frac{(1-\alpha) R_2 + R_3}{R_1 + R_2 + R_3} - \frac{\alpha R_2 + R_1}{R_1 + R_2 + R_3} \right) \cdot 8\,V$$

$$U_a = \frac{R_2 - \alpha R_2 + R_3 - \alpha R_2 - R_1}{R_1 + R_2 + R_3} \cdot 8\,V$$

$$U_a = \frac{R_3 - R_2 - 2\alpha R_2 - R_1}{R_1 + R_2 + R_3} \cdot 8\,V$$

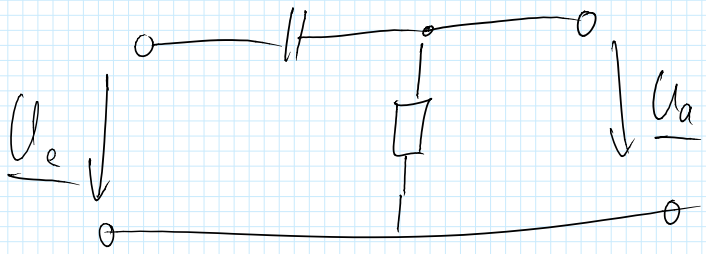
C1.6



$$\frac{1}{j\omega C} \qquad \frac{1}{}$$

$$U_a = \frac{\frac{1}{j\omega C}}{R + \frac{1}{j\omega C}} U_e = \frac{1}{j\omega RC - 1}$$

C 1.7



$$U_a = \frac{R}{R + \frac{1}{j\omega C}} U_e = \frac{j\omega RC}{j\omega RC + 1} U_e$$