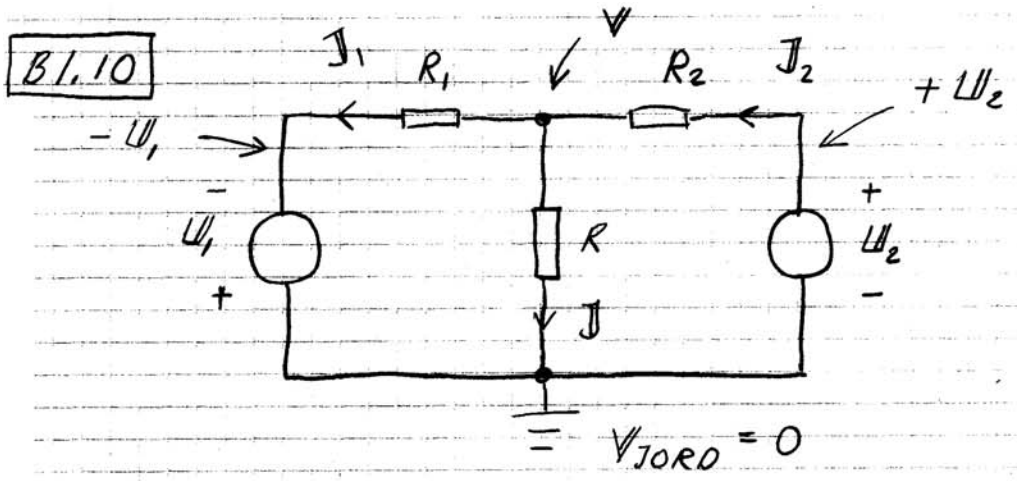
B1.10



$$R_1 = R_2 = R = 1\ k\Omega$$

$$u_1(t) = 30\sqrt{2}\sin(\omega t + 0)\ V$$

$$u_2(t) = 60\sin(\omega t + 45°)\ V$$

TRANSFORMATION TILL KOMPLEXA SPÄNNINGAR ⇒

$$\mathbb{U}_1 = 30\sqrt{2}\cdot e^{j0}\ V\ ,\quad \mathbb{U}_2 = 60\cdot e^{j45°}\ V = (30\sqrt{2} + j30\sqrt{2})\ V$$

NODANALYS: $\mathbb{I}_2 = \mathbb{I}_1 + \mathbb{I} \Rightarrow \mathbb{I}_2 - \mathbb{I}_1 - \mathbb{I} = 0 \Rightarrow$

$$\frac{\mathbb{U}_2 - \mathbb{V}}{R_2} - \frac{\mathbb{V} - (-\mathbb{U}_1)}{R_1} - \frac{\mathbb{V} - \mathbb{V}_{JORD}}{R} = 0$$

$$\frac{(30\sqrt{2} + j30\sqrt{2}) - \mathbb{V}}{1000} - \frac{\mathbb{V} + 30\sqrt{2}}{1000} - \frac{\mathbb{V} - 0}{1000} = 0$$

$$\Rightarrow \mathbb{V} = j10\sqrt{2} = 10\sqrt{2}\,e^{j90°}\ V$$

$$\mathbb{I} = \frac{\mathbb{V} - \mathbb{V}_{JORD}}{R} = 0{,}01\sqrt{2}\,e^{j90°}\ A \Rightarrow i(t) = 0{,}01\sqrt{2}\sin(\omega t + 90°)\ A$$

B1.10

Alternativ lösning

SUPERPOSITIONSSATSEN OCH SPÄNNINGSDELNING GER:

BIDRAGET FRÅN U_1 BLIR $U' = -\frac{1}{3} U_1$

BIDRAGET FRÅN U_2 BLIR $U'' = \frac{1}{3} \cdot U_2$

$$U = U' + U'' = 10\sqrt{2} \cdot e^{j180^\circ} + 20 \cdot e^{j45^\circ} =$$

$$= 10\sqrt{2}\, e^{j90^\circ} \quad \text{VOLT}$$

$$J = \frac{U}{R} \Rightarrow J = 10\sqrt{2} \cdot e^{j90^\circ} \quad \text{mA}$$

$$\Rightarrow i(t) = 10\sqrt{2} \sin(\omega t + 90^\circ) \text{ mA}$$