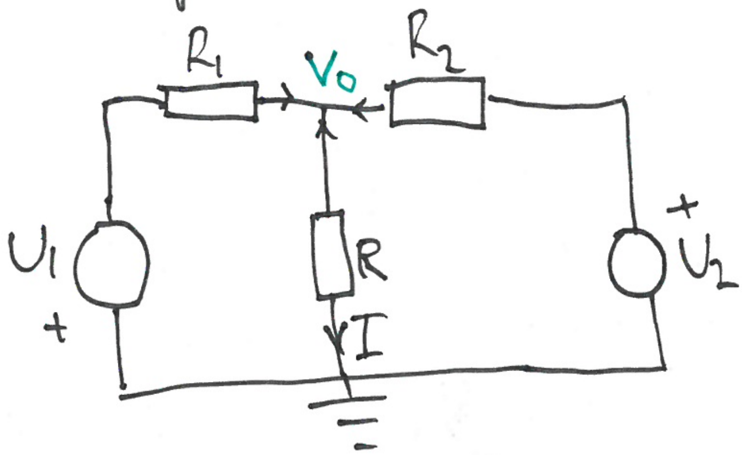
B 1.10) Lösning med nodanalys

Komplexschema:



$R_1 = 1,0$ kΩ
$R_2 = 1,0$ kΩ
$R = 1,0$ kΩ

Komplexa spänningar:

$U_1 = 30\sqrt{2}$

$U_2 = 60 \cdot e^{j \cdot \pi/4} =$
$= 30\sqrt{2} + j \cdot 30 \cdot \sqrt{2}$

Nod analys:

$$\frac{-U_1 - V_0}{R_1} + \frac{-V_0}{R} + \frac{U_2 - V_0}{R_2} = 0$$

$$\Leftrightarrow \left(-\frac{1}{R_1} - \frac{1}{R} - \frac{1}{R_2}\right) \cdot V_0 = \frac{U_1}{R_1} - \frac{U_2}{R_2}$$

$$\Leftrightarrow V_0 = \frac{\frac{U_1}{R_1} - \frac{U_2}{R_2}}{\left(-\frac{1}{R_1} - \frac{1}{R} - \frac{1}{R_2}\right)} = \frac{U_1 - U_2}{-3} = \frac{30 \cdot \sqrt{2} - (30 \cdot \sqrt{2} + j \cdot 30 \cdot \sqrt{2})}{-3}$$

$$= j \cdot 10 \cdot \sqrt{2} = 10 \cdot \sqrt{2} \cdot e^{j \cdot \pi/2} \text{ V}$$

$$I = \frac{V_0 - 0}{R} = \frac{V_0}{R} = 0.01 \cdot \sqrt{2} \cdot e^{j \cdot \pi/2} \text{ A}$$

$$\Rightarrow \boxed{i(t) = 0.01 \cdot \sqrt{2} \cdot \sin(\omega t + \pi/2) \text{ A}}$$