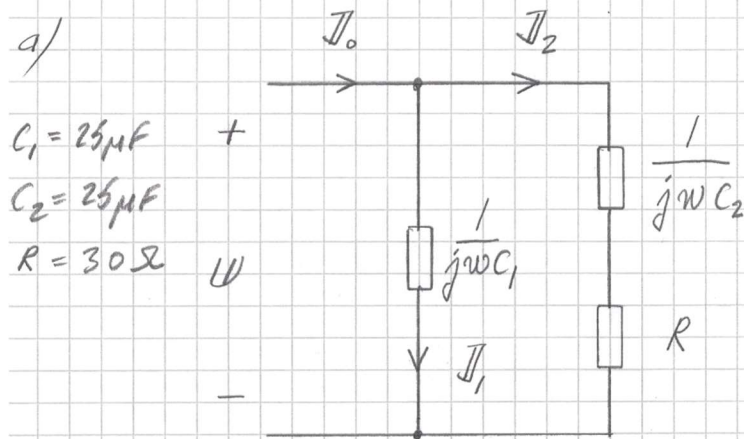


B1.5 a)



$$C_1 = 25 \mu\text{F}$$

$$C_2 = 25 \mu\text{F}$$

$$R = 30 \Omega$$

$$i_2(t) = 1,0\sqrt{2} \sin(1000t + 90^\circ) \text{ A} \rightsquigarrow \underline{I_2} = 1,0\sqrt{2} e^{j90^\circ} \text{ A}$$

OHMS LAG \Rightarrow

$$U = \left(R + \frac{1}{j\omega C_2} \right) \cdot I_2 \Rightarrow$$

$$U = (30 - j40) \cdot 1,0\sqrt{2} \cdot e^{j90^\circ} =$$

$$= \underbrace{\sqrt{30^2 + 40^2}}_{50} e^{j \arctan \frac{-40}{30}} \cdot 1,0\sqrt{2} e^{j90^\circ} =$$

$$= 50\sqrt{2} e^{j37^\circ} \text{ V}$$

$$\rightsquigarrow \underline{u(t)} = 50\sqrt{2} \sin(1000t + 37^\circ) \text{ V}$$

$$I_1 = \frac{U}{\frac{1}{j\omega C_1}} = j\omega C_1 U \Rightarrow$$

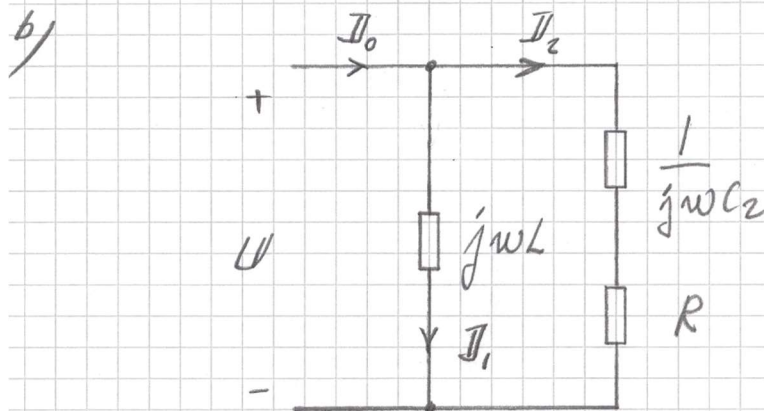
$$I_1 = j0,025 \cdot 50\sqrt{2} \cdot e^{j37^\circ} \text{ A} =$$

$$= 1,25\sqrt{2} \cdot e^{j90^\circ} \cdot e^{j37^\circ} = 1,25\sqrt{2} \cdot e^{j127^\circ} \text{ A}$$

$$\rightsquigarrow \underline{i_1(t)} \approx 1,3\sqrt{2} \sin(1000t + 127^\circ) \text{ A}$$

$$\begin{aligned}
 \underline{I}_0 &= \underline{I}_1 + \underline{I}_2 = 1,25\sqrt{2} e^{j127^\circ} + 1,0\sqrt{2} e^{j90^\circ} = \\
 &= 1,25\sqrt{2} (\cos 127^\circ + j \sin 127^\circ) + \\
 &+ 1,0\sqrt{2} (\cos 90^\circ + j \sin 90^\circ) = \\
 &= -0,75\sqrt{2} + j\sqrt{2} + 0 + j\sqrt{2} = \\
 &\approx 2,14\sqrt{2} e^{j110^\circ} \text{ A} \rightsquigarrow
 \end{aligned}$$

$$\underline{i}_0(t) \approx 2,1\sqrt{2} \sin(1000t + 110^\circ) \text{ A}$$



$$U = \left(R + \frac{1}{j\omega C_2} \right) \underline{I}_2 \Rightarrow$$

$$u(t) = 50\sqrt{2} \sin(1000t + 37^\circ) \text{ V}$$

(SAMMA SOM I A-UPPGIFTEN)

$$\underline{I}_1 = \frac{U}{j\omega L} = -j \cdot \frac{U}{\omega L} \Rightarrow$$

$$\underline{I}_1 = -j 0,025 \cdot 50\sqrt{2} e^{j37^\circ} = 1,25\sqrt{2} e^{-j53^\circ} \text{ A}$$

$$\rightsquigarrow \underline{i}_1(t) \approx 1,3\sqrt{2} \sin(1000t - 53^\circ) \text{ A}$$

$$\begin{aligned} \underline{I}_0 &= \underline{I}_1 + \underline{I}_2 = 1,25\sqrt{2} e^{-j53^\circ} + 1,0\sqrt{2} e^{j90^\circ} = \\ &= 1,25\sqrt{2} (\cos(-53^\circ) + j\sin(-53^\circ)) + \\ &+ 1,0\sqrt{2} (\cos 90^\circ + j\sin 90^\circ) = \\ &= 0,75\sqrt{2} - j\sqrt{2} + 0 + j\sqrt{2} = 0,75\sqrt{2} e^{j0^\circ} \\ &\leadsto \underline{i}_0(t) = 0,75\sqrt{2} \sin(1000t) \text{ A} \end{aligned}$$