Forslag til løsning.

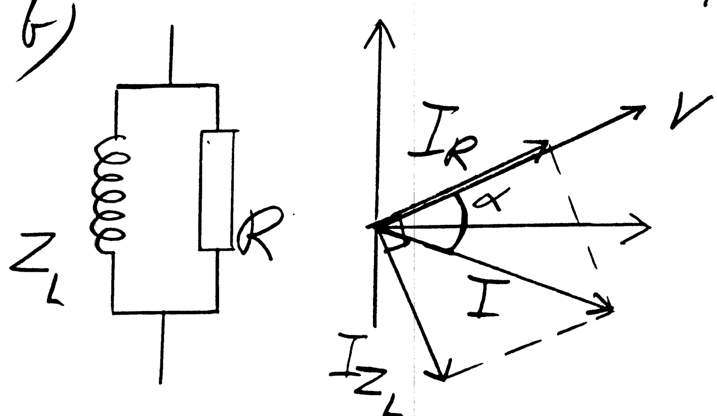
Oppgave 1.

a) Vinkelfrekvensen er $\omega = 2\pi f = 2\pi \cdot 3400\,s^{-1} = \underline{2{,}14 \cdot 10^4\,s^{-1}}$

Med dette finner en:

		Impedans	Fasevinkel
Motstanden:	$Z = R =$	$\underline{\underline{8{,}0\,\Omega}}$	$\underline{\underline{\alpha = 0}}$
Induktansen:	$Z = \omega L = 2{,}14 \cdot 10^4 \cdot 0{,}45 \cdot 10^{-3}\,\Omega =$	$\underline{\underline{9{,}6\,\Omega}}$	$\alpha = \frac{\pi}{2} = \underline{\underline{90^\circ}}$
Kapasitansen:	$Z = \frac{1}{\omega C} = \frac{1\,\Omega}{2{,}14 \cdot 10^4 \cdot 0{,}24 \cdot 10^{-9}} =$	$\underline{\underline{1{,}95 \cdot 10^5\,\Omega}}$	$\alpha = -\frac{\pi}{2} = \underline{\underline{-90^\circ}}$

b)



En har strømmene

$$I_R = \frac{1}{R} V$$

$$I_{Z_L} = \frac{1}{X} V$$

Resulterende strøm blir da

$$I = \sqrt{I_R^2 + I_{Z_L}^2} = \sqrt{\left(\frac{1}{R}\right)^2 + \left(\frac{1}{X}\right)^2}\, V = \frac{1}{Z} V$$

Impedansen blir følgelig

$$Z = \left(\sqrt{\frac{1}{R^2} + \frac{1}{X^2}}\right)^{-1} = \frac{RX}{\sqrt{R^2 + X^2}} = \frac{3{,}0 \cdot 4{,}0\,\Omega}{\sqrt{3{,}0^2 + 4{,}0^2}} = \underline{\underline{2{,}4\,\Omega}}$$

Fasevinkel: $\operatorname{tg} \alpha = \frac{I_{Z_L}}{I_R} = \frac{1/X}{1/R} = \frac{R}{X} = \frac{3}{4} = \underline{0{,}75}$

$$\alpha = \underline{\underline{36{,}9^\circ}}$$

Alternativt med komplekse tall:

Parallellkopling: $\frac{1}{Z} = \frac{1}{R} + \frac{1}{Z_L} \Rightarrow Z = \frac{R Z_L}{R + Z_L} =$

$\frac{RiX}{R + iX} = \frac{RX}{X - iR} = |Z| e^{i\alpha}$, dvs. $|Z| = \frac{RX}{(R^2+X^2)^{1/2}}$, $\operatorname{tg}\alpha = \frac{R}{X}$.