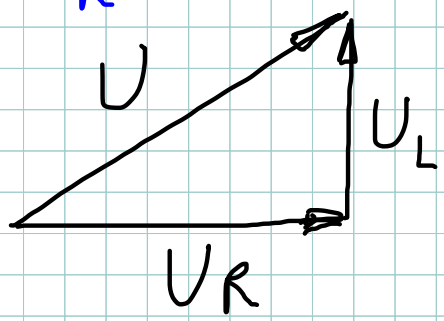
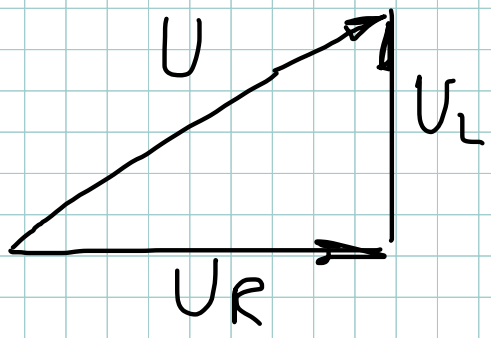
18.1 $U_R = 30\,V$ $U_L = 40\,V$



$$U = \sqrt{U_R^2 + U_L^2} = \sqrt{30^2 + 40^2} = 50\,V$$

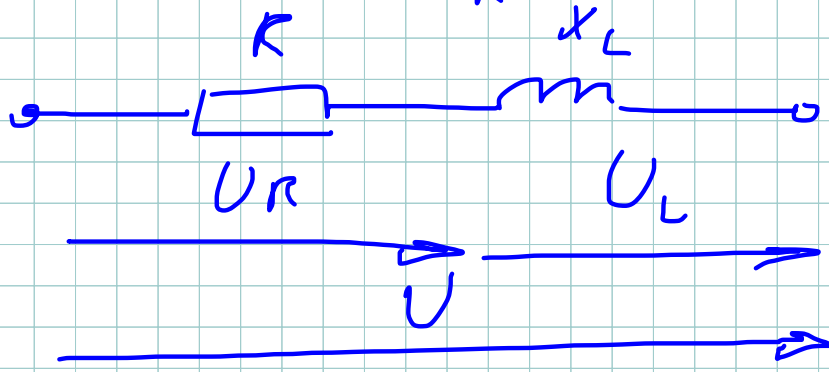
18.2 $U = 230\,V$ $U_L = 185\,V$



$$U_R = \sqrt{U^2 - U_R^2} = \sqrt{230^2 - 185^2} =$$

$$= 136{,}7\,V$$

18.3 $U = 42\,V$ $U_R = 36\,V$



$$U_L = \sqrt{U^2 - U_R^2} = \sqrt{42^2 - 36^2} = 21{,}6\,V$$

18.4 $R = 250\,\Omega$ $L = 0{,}8\,H$

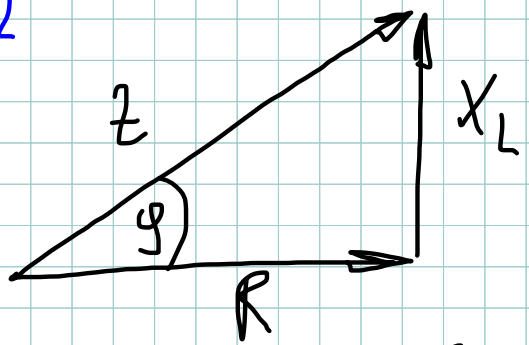
$f = 50\,Hz$ $U = 230\,V$

$$X_L = 2\pi f L = 2 \cdot \pi \cdot 50 \cdot 0{,}8 = 251{,}3\,\Omega$$

$$Z = \sqrt{R^2 + X_L^2} = \sqrt{250^2 + 251{,}3^2} = 354{,}5\,\Omega$$

18.5 $f = 3\,kHz$ $R = 3{,}3\,k\Omega$

$Z = 3{,}75\,k\Omega$



$$X_L = \sqrt{Z^2 - R^2} = \sqrt{3{,}75k^2 - 3{,}3k^2} =$$

$$= 1{,}78\,k\Omega$$

$$L = \frac{X_L}{2\pi f} = \frac{1{,}78k}{2 \cdot \pi \cdot 3k} = 94{,}5\,mH$$

18.6 $f = 50\,Hz$ $X_L = 230\,\Omega$

$Z = 300\,\Omega$

$$R = \sqrt{Z^2 - X_L^2} = \sqrt{300^2 - 230^2} = 193\,\Omega$$

18.7 $L = 200\,mH$ $f = 3{,}4\,kHz$

$Z = 4{,}3\,k\Omega$

$$X_L = 2\pi f L = 2 \cdot \pi \cdot 3{,}4\,k \cdot 200\,m = 4{,}27\,k\Omega$$

$$R = \sqrt{Z^2 - X_L^2} = \sqrt{4{,}3\,k^2 - 4{,}27\,k^2} = 485\,\Omega$$

Maßstab: $500\,\Omega \mathrel{\hat{=}} 1\,cm$

18.8 $f = 50\,Hz$

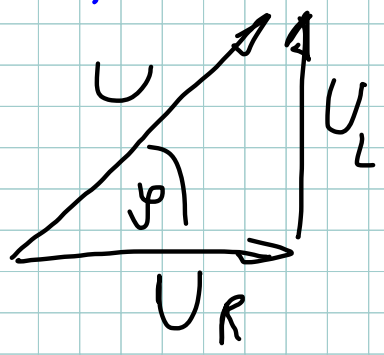
$U = 6{,}3\,V \qquad I = 23\,mA$

$R = 36\,\Omega$

$$Z = \frac{U}{I} = \frac{6{,}3}{23\,m} = 274\,\Omega$$

$$X_L = \sqrt{Z^2 - R^2} = \sqrt{274^2 - 36^2} = 272\,\Omega$$

18.9 $U = 60\,V$ $\cos\varphi = 0{,}28$



$\varphi = \arccos(0{,}28) = 73°$

$\cos\varphi = \frac{U_R}{U}$

$U_R = U \cdot \cos\varphi = 60 \cdot 0{,}28 = 16{,}8\,V$

$U_L = \sqrt{U^2 - U_R^2} = \sqrt{60^2 - 16{,}8^2} = 57{,}6\,V$

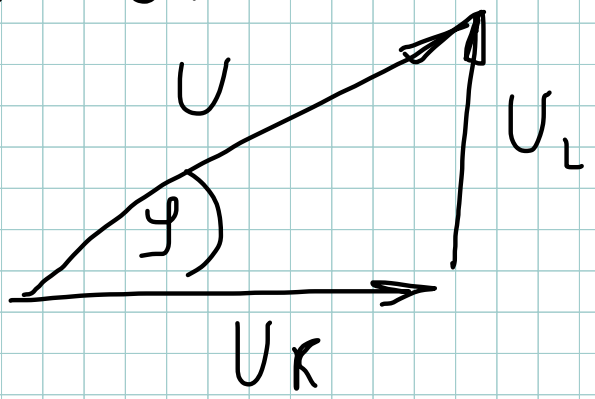
Maßstab: $10\,V \hat{=} 1\,cm$

18.10 $U_R = 160\,V$ $\cos\varphi = 0{,}45$

$$\cos\varphi = \frac{U_R}{U}$$

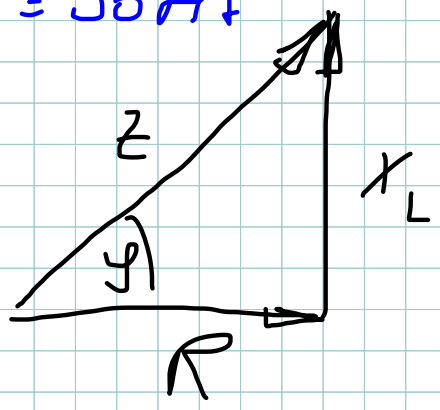
$$U = \frac{U_R}{\cos\varphi} = \frac{160}{0{,}45} = 356\,V$$

$$U_L = \sqrt{U^2 - U_R^2} = \sqrt{356^2 - 160^2} = 318\,V$$



18.11 $R = 32\ \Omega$ $f = 50\ Hz$

$\cos\varphi = 0{,}12$



$$\cos\varphi = \frac{R}{Z}$$

$$Z = \frac{R}{\cos\varphi} = \frac{32}{0{,}12} = 266{,}6\ \Omega$$

$$X_L = \sqrt{Z^2 - R^2} = \sqrt{266{,}6^2 - 32^2} =$$

$$= 264{,}7\ \Omega$$

18.12 $R = 120\,\Omega$ $L = 0{,}5\,H$

$f = 50\,Hz$ $U = 4\,V$

$$X_L = 2\pi f L = 2 \cdot \pi \cdot 50 \cdot 0{,}5 = 157\,\Omega$$

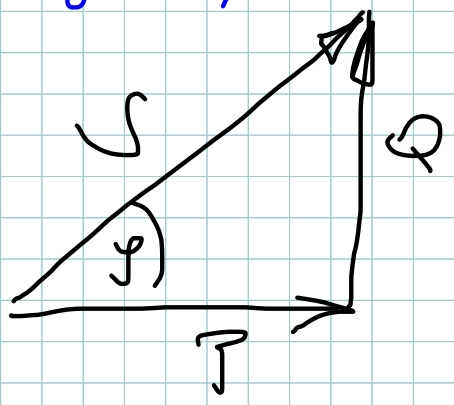
$$Z = \sqrt{R^2 + X_L^2} = \sqrt{120^2 + 157^2} = 197{,}6\,\Omega$$

$$\cos\varphi = \frac{R}{Z} = \frac{120}{197{,}6} = 0{,}607$$

$$\varphi = \arccos(0{,}607) = 52{,}6°$$

18.13 $U = 230\,V$ $f = 50\,Hz$

$S = 400\,VA$ $\cos\varphi = 0{,}8$



$$\cos\varphi = \frac{P}{S}$$

$$P = S \cdot \cos\varphi = 400 \cdot 0{,}8 = 320\,W$$

$$Q = \sqrt{S^2 - P^2} = \sqrt{400^2 - 320^2} = 240\,Var$$

18.15 $U = 230\,V$ $f = 50\,Hz$

$I = 4{,}2\,A$ $P = 640\,W$

$$S = U \cdot I = 230 \cdot 4{,}2 = 966\,VA$$

$$\cos\varphi = \frac{P}{S} = \frac{640}{966} = 0{,}66$$

$$Q = \sqrt{S^2 - P^2} = \sqrt{966^2 - 640^2} = 723{,}6\,Var$$

Maßstab: $100\,W \triangleq 1\,cm$