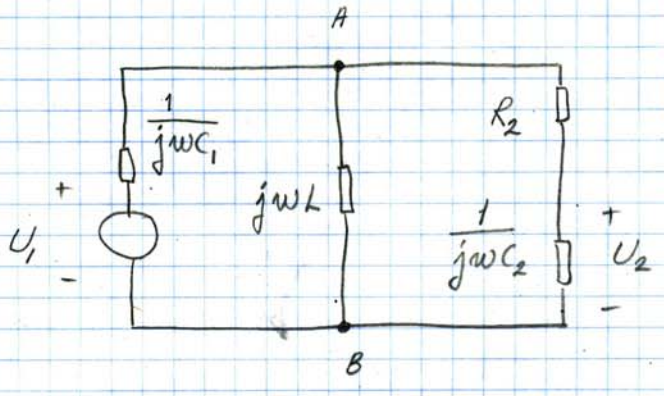
B1.9



$\omega = 500 \frac{RAD}{s}$

$L = 4H$

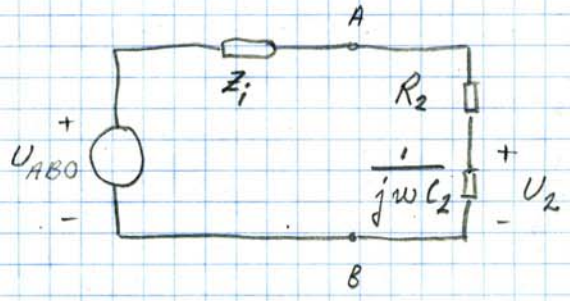
$C_2 = 0{,}5\ \mu F$

$$u_1(t) = \hat{U}_1 \cdot \sin(\omega t + \varphi_1) \Rightarrow U_1 = \hat{U}_1 \cdot e^{j\arg U_1}$$

$$u_2(t) = \hat{U}_2 \cdot \sin(\omega t + \varphi_2) \Rightarrow U_2 = \hat{U}_2 \cdot e^{j\arg U_2}$$

UPPGIFT: BESTÄM C_1 SÅ ATT $\arg U_1 = \arg U_2$

TVÅPOLSSATSEN $\Rightarrow$



$$U_{ABO} = U_1 \cdot \frac{j\omega L}{\frac{1}{j\omega C_1} + j\omega L} = U_1 \cdot \frac{-\omega^2 C_1 L}{1 - \omega^2 C_1 L}$$

$$Z_i = \frac{j\omega L \cdot \frac{1}{j\omega C_1}}{j\omega L + \frac{1}{j\omega C_1}} = \frac{j\omega L}{1 - \omega^2 C_1 L}$$

$$U_2 = U_{ABO} \frac{\frac{1}{j\omega C_2}}{Z_1 + R_2 + \frac{1}{j\omega C_2}} =$$

$$= U_1 \cdot \frac{-\omega^2 C_1 L}{1-\omega^2 C_1 L} \cdot \frac{1}{\frac{-\omega^2 C_2 L}{1-\omega^2 C_1 L} + j\omega C_2 R_2 + 1} =$$

$$= U_1 \cdot \frac{-\omega^2 C_1 L}{-\omega^2 C_2 L + j\omega C_2 R_2 - j\omega^3 C_1 C_2 L R_2 + 1 - \omega^2 C_1 L}$$

K

$$\arg U_2 = \arg U_1 + \arg K$$

$$\arg U_2 = \arg U_1 \Rightarrow \arg K = 0$$

$$\Rightarrow j\omega C_2 R_2 - j\omega^3 C_1 C_2 L R_2 = 0$$

$$1 - \omega^2 C_1 L = 0$$

$$\Rightarrow \boxed{C_1 = \frac{1}{\omega^2 L}} \rightarrow C_1 = 1\,\mu F$$

$$\rightarrow \quad U_2 = U_1 \cdot \frac{-1}{-\omega^2 C_2 L + 1 - 1}$$

$\omega^2 C_2 L \rightarrow 0{,}5$

$$\Rightarrow \quad \frac{U_1}{U_2} = \omega^2 L \, C_2 \quad (C_2 \rightarrow \frac{1}{C_1})$$

$$\frac{U_2}{U_1} = \frac{C_1}{C_2} = 2$$