$\underline{U}_L = j \cdot X_L \cdot \underline{I}$ $\quad X_L = \omega \cdot L \quad \frac{1}{j} = -j$

$\underline{U}_C = -j \cdot X_C \cdot \underline{I}$ $\quad X_C = \frac{1}{\omega C} \quad \frac{1}{-j} = j$

$\underline{U}_R = R \cdot \underline{I}$

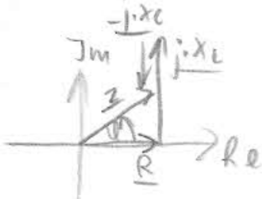
$\underline{U} = \underline{U} = Z \cdot \underline{I}$ Ohm's law for AC circuit

$\underline{I} = \underline{U} \cdot \underline{Y}$ Inverse Ohm's law for AC circuit

$\underline{U} = U \cdot e^{j\psi_u}$

$\underline{I} = I \cdot e^{j\psi_i}$

$\underline{Z} = Z \cdot e^{j\varphi}$

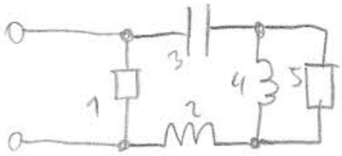


$\underline{Z}$ - impedance

$\underline{Y}$ - admittance $\quad \underline{Y} = \frac{1}{\underline{Z}}$ [S]

$j^2 = -1$

Designate total impedance of circuit shown below:



$Z_k = 1 \ (k = 1, 2, 3, 4, 5)$

$\underline{Z}_1 = 1$ [Ω]
$\underline{Z}_2 = j$ [Ω]
$\underline{Z}_3 = -j$ [Ω]
$\underline{Z}_4 = j$ [Ω]
$\underline{Z}_5 = 1$ [Ω]

$$\underline{Y}_{45} = \underline{Y}_4 + \underline{Y}_5 = \frac{1}{j} + \frac{1}{1} = -j + 1 = 1 - j$$

$$\underline{Z}_{234} = \underline{Z}_2 + \underline{Z}_3 + \frac{1}{\underline{Y}_{45}} = j - j + \frac{1}{(1-j)} = \frac{1(1+j)}{(1-j)\cdot(1+j)} = \frac{1+j}{1+j-j+1}$$

$$\underline{Z}_{234} = \frac{1+j}{2}$$

$$\underline{Y}_{12345} = \underline{Y}_1 + \frac{1}{\underline{Z}_{234}} = 1 + \frac{2}{1+j} = 1 + \frac{2(1-j)}{(1+j)(1-j)} =$$

$$\underline{Y}_{12345} = 1 + \frac{2(1-j)}{(1-j+j+1)} = 1 + \frac{2(1-j)}{2} = 1 + 1 - j = 2 - j \ [S]$$

$$\underline{Z}_{12345} = \frac{1}{\underline{Y}_{12345}} = \frac{1}{2-j} = \frac{2+j}{(2-j)(2+j)} = \frac{2+j}{(4+2j-2j+1)} = \frac{2+j}{5} \ [\Omega]$$

$$\underline{Z}_{12345} = \frac{1}{5} \cdot (2 + j) \ [\Omega]$$