

## Complexes

$$\bar{z} := \text{Re}(z) - i \cdot \text{Im}(z)$$

$$\varepsilon(z) := \begin{cases} \frac{|z|}{z} \\ \frac{|z|}{z} \cdot \frac{|z|}{\arg(z)} \text{ DegOrRad} \end{cases} \quad \text{DegOrRad} := \text{deg}$$

☐ Without units

Input complexes

$$z_1 := 3 \cdot e^{i \cdot 30^\circ}$$

$$z_2 := 2 \cdot e^{i \cdot 20^\circ}$$

$$w_1 := z_1 + z_2 = 4.4775 + 2.184 \cdot i$$

$$w_1 = \begin{cases} 4.9817 \\ 26.0024 + 2.5433 \cdot 10^{-15} \cdot i \end{cases} \varepsilon(w_1)$$

$$w_2 := z_1 - z_2 = 0.7187 + 0.816 \cdot i$$

$$w_2 = \begin{cases} 1.0873 - 1.8196 \cdot 10^{-16} \cdot i \\ 48.6267 \end{cases} \varepsilon(w_2)$$

$$w_3 := z_1 \cdot z_2 = 3.8567 + 4.5963 \cdot i$$

$$w_3 = \begin{cases} 6 \\ 50 \end{cases} \varepsilon(w_3)$$

$$w_4 := \frac{z_1}{z_2} = 1.4772 + 0.2605 \cdot i$$

$$w_4 = \begin{cases} 1.5 + 4.7923 \cdot 10^{-17} \cdot i \\ 10 \end{cases} \varepsilon(w_4)$$

☐ With Units

Series RLC

$$R := 10 \, \Omega$$

$$L := 500 \, \mu\text{H}$$

$$C := 300 \, \mu\text{F}$$

$$\omega := 50 \, \text{Hz}$$

Without  $\varepsilon$  function

With  $\varepsilon$  function

$$\begin{cases} I := 50 \, \text{mA} \cdot e^{i \cdot \varphi_I} \\ \varphi_I := 30^\circ \end{cases} \quad I = (0.0433 + 0.025 \cdot i) \, \text{A}$$

$$I = 0.05 \, \text{A} \cdot e^{i \cdot \varphi_I}$$

$$I = \begin{cases} 0.05 \, \text{A} \\ 30 \end{cases} \varepsilon(I)$$

$$Z := R + \omega \cdot i \cdot L + \frac{1}{\omega \cdot i \cdot C}$$

$$Z = (10 - 66.6417 \cdot i) \, \Omega$$

$$\varphi_Z := \arg(Z)$$

$$Z = \begin{cases} 67.39 \frac{\text{kg m}^2}{\text{s}^3 \text{A}^2} \\ -81.47 \end{cases} \varepsilon(Z)$$

$$Z = (67.3878 - 8.0528 \cdot 10^{-14} \cdot i) \Omega e^{i \cdot \varphi_Z}$$

$$V := Z \cdot I$$

$$V = (2.0991 - 2.6357 \cdot i) V$$

$$\varphi_V := \arg(V)$$

$$V = (3.3694 - 4.9671 \cdot 10^{-16} \cdot i) V e^{i \cdot \varphi_V}$$

$$V = \begin{cases} (3.3694 - 4.5396 \cdot 10^{-16} \cdot i) \frac{\text{kg m}^2}{\text{A s}^3} \varepsilon (V) \\ -51.4661 + 8.7512 \cdot 10^{-15} \cdot i \end{cases}$$

$$\begin{cases} i(t) := |I| \cdot \sin(\omega \cdot t + \varphi_I) \\ v(t) := |V| \cdot \sin(\omega \cdot t + \varphi_V) \\ p(t) := v(t) \cdot i(t) \end{cases}$$

