

Complex functions for Engineering Students

Exercise class 1

Exercise 1:

Given the complex numbers $z_1 = 3 + 2i$ and $z_2 = 5 - 4i$, determine the Cartesian representation of

- a) $z_1 + z_2$, $|z_1 + z_2|$, $4z_1 - 7iz_2$, $4\bar{z}_1 - 7i\bar{z}_2$,
- b) $z_1 \cdot z_2$, $\bar{z}_1 \cdot \bar{z}_2$, $z_1^3 \cdot z_2^2$, $\operatorname{Re}(z_1^3) \cdot \operatorname{Im}(z_2^2)$,
- c) $\frac{z_1}{z_2}$, $\frac{\operatorname{Im}(z_1)}{\operatorname{Re}(z_2)}$.

Exercise 2:

Consider the complex numbers

$$z_1 = 1, z_2 = i, z_3 = -1, z_4 = -i.$$

- a) Express $z_1 + z_2, z_2 + z_3, z_1 + z_4$ in polar coordinates.
- b) Compute in Cartesian and polar coordinates

$$(z_1 + z_2)^7, \quad \frac{z_2 + z_3}{\bar{z}_1 + \bar{z}_2}, \quad \frac{z_1 + z_4}{z_2}.$$

Exercise 3:

Compute all solutions of

$$z^6 = 1$$

in polar and Cartesian coordinates.

Dates of classes: 3.4.- 7.4.