

0C2 Exercise Sheet 1

Complex numbers

In the following exercises 1,2 and 3, define complex numbers:

$$z_1 = 2 - 3i, \quad z_2 = 4 + i, \quad z_3 = -2, \quad z_4 = -3i.$$

1. Draw z_1, z_2, z_3 and z_4 on the complex plane. What are the real and imaginary parts of z_1, z_2, z_3 and z_4 ?

2. For the z_1, z_2, z_3 and z_4 defined above, compute

(a) $z_1 + z_2$

(b) $z_1 z_2$

(c) $(z_1 + z_4) z_3$

(c) $z_1 z_2 z_3 z_4$

and draw them on the complex plane.

3. Compute the modulus and complex conjugates of z_1, z_2, z_3 and z_4 .

4. Find all the solutions $x \in \mathbb{C}$ to the quadratic equation

$$x^2 + 2x + 2 = 0.$$

Draw them on the complex plane and compute their modulus and complex conjugates.

5. Find the argument $\text{Arg } z$ of the complex number

$$z = 1 + i.$$

6. Find the polar coordinate form of the complex number

$$z = 1 + i.$$

What is the exponential form of z ? Compute the power z^9 using the exponential form.

7. Find the polar coordinate form of the complex number

$$z = 2 - 7i.$$

What is the exponential form of z ?