

Further Pure Mathematics 1

Complex Numbers

Section 2: The Argand diagram

Exercise

1. Given that $z_1 = 3 + 2j$ and $z_2 = 4 - j$, represent z_1 , z_2 , $z_1 + z_2$ and $z_1 - z_2$ on an Argand diagram.
2. Given that $z_1 = 12 + 5j$ and $z_2 = -3 + 4j$, verify that $|z_1 + z_2| \leq |z_1| + |z_2|$.
Explain geometrically using an Argand diagram why $|z_1 + z_2| \leq |z_1| + |z_2|$ is always true.
3. Given that $z_1 = 12 + 5j$ and $z_2 = 3 - 4j$ verify that $|z_1 - z_2| \geq |z_1| - |z_2|$. With reference to an Argand diagram give a geometric explanation of this result.
4. Given that $z = 2 + j$ show on an Argand diagram z , z^* , jz , and jz^* . What transformation describes the relationship between
 - (i) z and z^*
 - (ii) z and jz .
5. Draw an Argand diagram showing the set of points z for which the given condition is true.
 - (i) $|z - 1 + j| = 1$
 - (ii) $|z - 2 - 3j| < 4$
 - (iii) $1 < |z| < 2$
6. Given that z is a complex number such that $|z - j| = 1$, find the greatest and least values of $|z + 1|$.