

EdExcel Further Pure 1

Complex Numbers

Section 1: Introduction to complex numbers

Exercise

1. Find the roots of the following equations:

(i) $z^2 + 25 = 0$

(ii) $4z^2 + 9 = 0$

(iii) $z^2 - 2z + 2 = 0$

(iv) $4z^2 + 4z + 5 = 0$

2. In each of the following cases find

(a) $z_1 + z_2$

(b) $z_1 - z_2$

(c) $z_1 z_2$

(d) z_1^*

(e) z_2^*

(f) $z_1^* + z_2^*$

(g) $z_1^* - z_2^*$

(h) $z_1^* z_2^*$

(i) $z_1 = 2 + 3i$; $z_2 = 1 - 2i$

(ii) $z_1 = -2i$; $z_2 = 3 + i$

What do you notice about the results?

3. Given that $z = (a + i)^4$ where a is real, find values for a such that

(a) z is real,

(b) z is wholly imaginary.

4. Simplify and write in the form $a + bi$

(i) $\frac{1}{3+2i} + \frac{1}{3-2i}$

(ii) $3+i + \frac{4}{3-i}$

(iii) $\frac{3}{1-i} - \frac{2i}{2+i}$

5. Find the values of p and q given that one root of the equation $z^2 + pz + q = 0$ is

(i) $2 - i$

(ii) $1 - 3i$

(iii) $2i$

(iv) $5 - 3i$

6. Given that $\frac{5}{a+bi} + \frac{2}{1+3i} = 1$, where a and b are real, find a and b .