

Complex numbers

chapter

3

Section 3.2 Complex numbers

PROJECT MATHS
Text & Tests 6

98

Example 1

Solve the equation $x^2 + 25 = 0$.

$$x^2 = -25$$

$$x = \pm\sqrt{-25}$$

Example 2

Solve the equation $x^2 + 2x + 2 = 0$.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = 1$$

$$b = 2$$

$$c = 2$$

$$x = \frac{-2 \pm \sqrt{(2)^2 - 4(1)(2)}}{2(1)}$$

$$= \frac{-2 \pm \sqrt{4 - 8}}{2}$$

$$= \frac{-2 \pm \sqrt{-4}}{2} = \frac{-2 \pm 2i}{2} = -1 \pm i$$

$$x = -1 + i \text{ and } x = -1 - i$$

Imaginary nos.

$$\sqrt{-64} = 8i$$

$$\sqrt{-8} = 2\sqrt{2}i$$

$$\sqrt{-3} = \sqrt{3}i$$

$i = \sqrt{-1}$ $i^2 = -1$

Complex Nos

$$z_1 = 3 + 2i \quad z_2 = -1 + 3i$$

Add

$$z_1 + z_2 = \begin{array}{r} 3 + 2i \\ -1 + 3i \\ \hline 2 + 5i \end{array}$$

Subtract

$$z_1 - z_2 = \begin{array}{r} 3 + 2i \\ -1 + 3i \\ \hline 4 - i \end{array}$$

multiply by
number

$$2z_1 = 2(3 + 2i) = 6 + 4i$$

multiply 2
Complex nos

$$\begin{aligned} z_1 \cdot z_2 &= (3 + 2i)(-1 + 3i) \\ &= -3 + 9i - 2i + 6i^2 \\ &= -9 + 7i \end{aligned}$$

$$i^2 = -1$$

HW Q1-6

Exercise 3.2

1. Write each of the following numbers in terms of i :

(i) $\sqrt{-4}$

$= \sqrt{4} i$

$= 2i$

(ii) $\sqrt{-36}$

$= \sqrt{36} i$

$= 6i$

(iii) $\sqrt{-27}$

$= \sqrt{27} i$

$= 3\sqrt{3} i$

(iv) $\sqrt{-20}$

$= \sqrt{20} i$

$= 2\sqrt{5} i$

2. Solve each of the following equations, giving your answer in the form bi , where b is a real number.

(i) $x^2 + 9 = 0$

$$x^2 = -9$$

$$x = \pm\sqrt{-9}$$

$$= \pm 3i$$

$$x = \pm 3i$$

(ii) $x^2 + 12 = 0$

$$x^2 = -12$$

$$x = \pm\sqrt{-12}$$

$$= \pm\sqrt{12}i$$

$$= \pm 2\sqrt{3}i$$