

Roots of Quadratic Equations

Exercise 1E

$$1 \text{ a) } z^2 + 2z + 26 = 0 \quad \alpha, \beta$$

$$z = \frac{-2 \pm \sqrt{4 - 104}}{2} = \frac{-2 \pm 10i}{2}$$

$$\alpha = -1 + 5i \quad \beta = -1 - 5i$$

$$\alpha + \beta = -2 \quad \alpha\beta = 1^2 + 5^2 = 26$$

$$3) \quad \begin{array}{l} \text{One root is } z + 3i \\ \text{Other root is } z - 3i \end{array}$$

$$\alpha + \beta = 4 \quad \alpha\beta = 2^2 + 3^2 = 13$$

$$\underline{z^2 - 4z + 13 = 0}$$

Alternative

$$(z - (2 + 3i))(z - (2 - 3i)) = 0$$

$$((z - 2) - 3i)((z - 2) + 3i) = 0$$

$$(z - 2)^2 + 3^2 = 0$$

$$z^2 - 4z + 4 + 9 = 0$$

$$\underline{z^2 - 4z + 13 = 0}$$

5)

$$z_1 = -5 + 4i$$

$$z_1^* = -5 - 4i$$

$$z_1 + z_1^* = -10$$

$$z_1 z_1^* = (-5)^2 + 4^2 = 41$$

$$\text{Eqn } z^2 + 10z + 41 = 0$$

7)

$$z_1 = 3 - 5i$$

$$z_2 = 3 + 5i$$

$$z_1 + z_2 = 6 \quad z_1 z_2 = 3^2 + 5^2 = 34$$

$$\underline{z^2 - 6z + 34 = 0}$$
