

Exercise 1.

$$\frac{-2 + 3i}{4 - 2i} = \frac{(-2 + 3i)(4 + 2i)}{(4 - 2i)(4 + 2i)} = \frac{-14 + 8i}{20}$$

$$i^{13} = i^2 \cdot i^2 \cdot i^2 \cdot i^2 \cdot i^2 \cdot i^2 \cdot i = i$$

$$(5 + 2i^3) \cdot (7 + 3i^{13}) = (5 - 2i) \cdot (7 + 3i) = 41 + i$$

Exercise 2.

$$z_1 = -\sqrt{3} + \sqrt{3}i$$

$$\left. \begin{array}{l} |z_1| = \sqrt{6} \\ \phi = \frac{3}{4}\pi \end{array} \right\} \Rightarrow z_2 = \sqrt{6} \left(\cos \frac{3}{4}\pi + i \cdot \sin \frac{3}{4}\pi \right)$$

$$z_2 = -3\sqrt{3} - 3i$$

$$\left. \begin{array}{l} |z_2| = 6 \\ \phi = \frac{7}{6}\pi \end{array} \right\} \Rightarrow z_2 = 6 \left(\cos \frac{7}{6}\pi + i \cdot \sin \frac{7}{6}\pi \right)$$

Exercise 3.

$$z_1^{18} = \sqrt{6}^{18} \left(\cos \left(18 \cdot \frac{3}{4}\pi \right) + i \cdot \sin \left(18 \cdot \frac{3}{4}\pi \right) \right) = 6^9 \left(\cos 13\frac{1}{2}\pi + i \cdot \sin 13\frac{1}{2}\pi \right)$$

$$= 6^9 \left(\cos \frac{3}{2}\pi + i \cdot \sin \frac{3}{2}\pi \right) = 6^9(0 - i) = -6^9i$$

Exercise 4.

$$x^2 + 8x + 25 = 0$$

$$\Delta = -36 = 36i^2$$

$$x_1 = \frac{-8 - 6i}{2} = -4 - 3i$$

$$x_2 = \frac{-8 + 6i}{2} = -4 + 3i$$