

$$1.2 \text{ d } (2-3i)(3-2i) = 6 - 4i - 9i + 6i^2 = -7-13i$$

$$f \quad (1+2i)^5 = ((1+2i)^2)^2 \cdot (1+2i) = (-3+4i)^2 \cdot (1+2i) = (-7-24i) \cdot (1+2i) = 4-7-30i-48 = -44-30i$$

$$1.3 \text{ c } \frac{2-3i}{3+2i} = \frac{2-3i}{3+2i} = \frac{2-3i}{3+2i} \cdot \frac{3-2i}{3-2i} = \frac{6-7i+6i^2}{9-4i^2} = \frac{-1-i}{5} = -\frac{1}{5} - \frac{1}{5}i$$

$$1.4 \text{ d } \begin{aligned} z &= 2+i & z^* &= 2-i & |z|^2 &= z \cdot z^* = (2+i)(2-i) = 4-i^2 = 5 \\ |z| &= \sqrt{5} \end{aligned}$$

$$1.4 \text{ e } \begin{aligned} z &= 2+i\sqrt{5} & z^* &= 2-i\sqrt{5} & |z|^2 &= z \cdot z^* = (2+i\sqrt{5})(2-i\sqrt{5}) \\ &= 4-i^2 5 = 9 & |z| &= 3 \end{aligned}$$

$$1.) \text{ c } a = \frac{1}{\sqrt{N}} \quad a^2 + b^2 = 1$$

$$\left(\frac{1}{\sqrt{N}}\right)^2 + b^2 = 1$$

$$\frac{1}{N} + b^2 = 1 \quad 1 - \frac{1}{N} = b^2$$

$$\sqrt{1 - \frac{1}{N}} = b$$

$$1.10 \text{ b}$$

$$z^3 - 1 = 0 \quad \theta = 0$$

$$z^3 = 1$$

$$\cos \theta = 1 \quad \sin \theta = 0$$

$$\sqrt[3]{1} = \cos \frac{0+2\pi k}{3} + i \sin \frac{0+2\pi k}{3}$$

$$k \in \{0, 1, 2\}$$

$$k = 0$$

$$\cos \frac{0}{3} + i \sin \frac{0}{3} = 1$$

$$k=1 \quad \cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3} = -0.5 + i \sin \frac{2\pi}{3} = -0.5 + i \frac{\sqrt{3}}{2}$$

$$k=2 \quad \cos \frac{4\pi}{3} + i \sin \frac{4\pi}{3} = -0.5 + i \sin \frac{4\pi}{3} = -0.5 + i \left(-\frac{\sqrt{3}}{2} \right)$$