3.89
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$$z^3 = (-2-2i)(\sqrt{3}i-1) = 2(-1-i)(\sqrt{3}i-1) = 2\cdot\sqrt{2}\,\mathrm{cis}\,225\cdot 2\,\mathrm{cis}(120)$$

$$z^3 = 4\sqrt{2}\,\mathrm{cis}(345) = 4\sqrt{2}\,\mathrm{cis}\left(\frac{23\pi}{12}\right) = 2^{2.5}\,\mathrm{cis}\left(\frac{23\pi}{12}\right)$$

$$z_k = \sqrt[6]{2^5}\,\mathrm{cis}\left(\frac{23\pi}{36} + \frac{2\pi k}{3}\right) \qquad k = 0,1,2,$$

3.89
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$$z_1 \cdot z_2 = r_1 \cdot r_2\,\mathrm{cis}\,\varphi_1\,\mathrm{cis}\,\varphi_2$$

$$\mathrm{cis}\,\varphi_1 \cdot \mathrm{cis}\,\varphi_2 = (\cos\varphi_1 + i\sin\varphi_1)(\cos\varphi_2 + i\sin\varphi_2) =$$

$$(\cos\varphi_1\cos\varphi_2 - \sin\varphi_1\sin\varphi_2) + i(\sin\varphi_1\cos\varphi_2 + \cos\varphi_1\sin\varphi_2) = \cos(\varphi_1+\varphi_2) + i\sin(\varphi_1+\varphi_2)$$

$$\frac{z_1}{z_2} = \frac{r_1\,\mathrm{cis}\,\varphi_1}{r_2\,\mathrm{cis}\,\varphi_2}, \quad \frac{\cos\varphi_1 + i\sin\varphi_1}{\cos\varphi_2 + i\sin\varphi_2} \cdot \frac{\cos\varphi_2 - i\sin\varphi_2}{\cos\varphi_2 - i\sin\varphi_2} =$$

$$\frac{(\cos\varphi_1\cos\varphi_2 + \sin\varphi_1\sin\varphi_2) + i(\sin\varphi_1\cos\varphi_2 - \cos\varphi_1\sin\varphi_2)}{\cos^2\varphi_2 + \sin^2\varphi_2} = \mathrm{cis}(\varphi_1-\varphi_2) + i\sin(\varphi_1-\varphi_2)$$