

$$z_1 = 2\sqrt{3} + 2i$$

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$$= 4 \left(\frac{\sqrt{3}}{2} + \frac{1}{2}i \right)$$

$$= 4 \left(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6} \right)$$

$$\boxed{z_2 = 4 e^{i \frac{\pi}{6}}}$$

إذن

$$z_2 = \frac{3}{1-i}$$

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$$= \frac{3}{\sqrt{2} \left(\frac{\sqrt{2}}{2} - i \frac{\sqrt{2}}{2} \right)}$$

$$= \frac{3}{\sqrt{2} e^{i - \frac{\pi}{4}}}$$

$$\boxed{z_2 = \frac{3}{\sqrt{2}} e^{i \frac{\pi}{4}}}$$

إذن

$$1 + i = \sqrt{2} e^{i \frac{\pi}{4}} \quad \text{و} \quad 1 + i\sqrt{3} = 2 e^{i \frac{\pi}{3}} \quad \text{لدينا} *$$

$$z_3 = \frac{2 e^{i \frac{\pi}{3}}}{\sqrt{2} e^{i \frac{\pi}{4}}} = \sqrt{2} e^{i \left(\frac{\pi}{3} - \frac{\pi}{4} \right)}$$

إذن

$$\boxed{z_3 = \sqrt{2} e^{i \frac{\pi}{12}}}$$

إذن

$$z_4 = \frac{(\sqrt{6} - i\sqrt{2})(1 + i)}{\sqrt{3} + i}$$

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$$= \frac{2\sqrt{2} e^{-i\frac{\pi}{6}} \cdot \sqrt{2} e^{i\frac{\pi}{4}}}{2 e^{i\frac{\pi}{6}}}$$

$$= 2 e^{-i\frac{\pi}{6} - \frac{\pi}{6} + \frac{\pi}{4}}$$

$$z_4 = 2 e^{-i\frac{\pi}{12}}$$

إذن

$$z_5 = (1 - i\sqrt{3})^4$$

$$= \left(2 e^{-i\frac{\pi}{3}}\right)^4$$

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$$z_5 = 2^4 \cdot e^{-i\frac{4\pi}{3}}$$

إذن

$$z_6 = \frac{1 + i}{(\sqrt{3} - i)^3}$$

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$$= \frac{\sqrt{2} e^{i\frac{\pi}{4}}}{\left(2 e^{-i\frac{\pi}{6}}\right)^3}$$

$$= \frac{\sqrt{2} e^{i\frac{\pi}{4}}}{8 \cdot e^{-i\frac{\pi}{2}}}$$

$$z_6 = \frac{\sqrt{2}}{8} e^{i\frac{3\pi}{4}}$$

إذن

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