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次の計算をせよ。

(1) $(1 + \sqrt{3}i)^6$

(2) $\left(\frac{3 + \sqrt{3}i}{2}\right)^{-4}$

$$\begin{aligned} (1) \text{ 与式} &= \left\{ 2 \left(\frac{1}{2} + \frac{\sqrt{3}}{2} i \right) \right\}^6 \\ &= 2^6 \left(\cos \frac{\pi}{3} + i \sin \frac{\pi}{3} \right)^6 \\ &= 64 \left(\cos 2\pi + i \sin 2\pi \right) \\ &= \underline{64} \end{aligned}$$

$$\begin{aligned} (2) \text{ 与式} &= \left\{ \sqrt{3} \left(\frac{\sqrt{3} + i}{2} \right) \right\}^{-4} \\ &= \left\{ \sqrt{3} \left(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6} \right) \right\}^{-4} \\ &= \frac{1}{9} \left\{ \cos \left(-\frac{2}{3}\pi \right) + i \sin \left(-\frac{2}{3}\pi \right) \right\} \\ &= \frac{1}{9} \left(-\frac{1}{2} - \frac{\sqrt{3}}{2} i \right) \\ &= \underline{-\frac{1}{18} - \frac{\sqrt{3}}{18} i} \end{aligned}$$

