

Aufgabe 5.61

Berechnen Sie $1,5^{222222} \left(\frac{1}{\sqrt{3}} - \frac{1}{\sqrt{3}i} \right)^{444444}$!

Lösung:

$$\frac{1}{i} = \frac{-i}{i(-i)} = -i$$

$$\begin{aligned} 1,5^{222222} \left(\frac{1}{\sqrt{3}} - \frac{1}{\sqrt{3}i} \right)^{444444} &= \left(\frac{3}{2} \right)^{222222} \left(\frac{1+i}{\sqrt{3}} \right)^{444444} \\ &= \left(\frac{3}{2} \right)^{222222} \left(\frac{\sqrt{2} (\cos \frac{\pi}{4} + i \sin \frac{\pi}{4})}{\sqrt{3}} \right)^{444444} \\ &= \left(\frac{3}{2} \right)^{222222} \left(\frac{2}{3} \right)^{222222} \left(\cos \frac{444444 \pi}{4} + i \sin \frac{444444 \pi}{4} \right) \\ &= \cos 111111 \pi + i \sin 111111 \pi = \cos \pi + i \sin \pi = \underline{\underline{-1}} \end{aligned}$$