Complex numbers in polar form

Recall that the polar form of complex numbers is $r(\cos\theta + i\sin\theta)$ where $r \in \mathbb{R}_+$ and $\theta \in [0, 2\pi)$.

Exercise 2.7

Compute the following products by transforming the numbers to polar form:

a. $\left(\frac{1}{2} - i\frac{\sqrt{3}}{2}\right) \cdot (-3 + 3i) \cdot \left(2\sqrt{3} + 2i\right)$

b. $(1 + i) \cdot (-2 - 2i) \cdot i$

Solution Exercise 2.7

a. $$\left(\frac{1}{2} - i\frac{\sqrt{3}}{2}\right) \cdot (-3 + 3i) \cdot \left(2\sqrt{3} + 2i\right) = e^{-\frac{1}{3}\pi i} \cdot \sqrt{18}e^{\frac{3}{4}\pi i} \cdot 4e^{\frac{1}{6}\pi i}$$
$$= 12\sqrt{2}e^{\frac{7}{12}\pi i}$$

b. $$(1 + i) \cdot (-2 - 2i) \cdot i = \sqrt{2}e^{\frac{1}{4}\pi i} \cdot \sqrt{8}e^{-\frac{3}{4}\pi i} \cdot e^{\frac{1}{2}\pi i}$$
$$= 4e^{0}$$
$$= 4$$