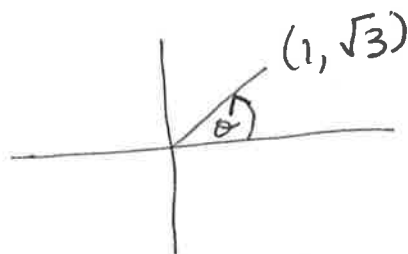


2.2

10(a) $(1 + \sqrt{3}i)^{-1}$

Let $z = 1 + \sqrt{3}i$



$$\therefore |z| = 2 ; \arg z = \tan^{-1}(\sqrt{3}) = \frac{\pi}{3}$$

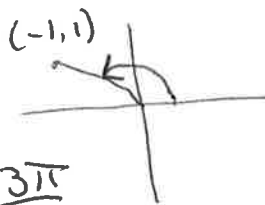
$$\therefore z = 2 \operatorname{cis} \frac{\pi}{3}$$

$$\left| \frac{1}{z} \right| = \frac{|1|}{|z|} = \frac{1}{2} ; \arg z^{-1} = -\arg z = -\frac{\pi}{3}$$

$$\therefore z^{-1} = \frac{1}{2} \operatorname{cis} \left(-\frac{\pi}{3} \right)$$

10(b) let $w = -1 + i$

$$|w| = \sqrt{2} ; \arg w = \frac{3\pi}{4}$$



$$w = \sqrt{2} \operatorname{cis} \frac{3\pi}{4}$$

$$|z^n| = |z|^n$$

$$\therefore |w^{18}| = |w|^{18} = (\sqrt{2})^{18} = 512$$

$$\arg z^n = n \arg z$$

$$\therefore \arg w^{18} = 18 \arg w = 18 \times \frac{3\pi}{4} = \frac{27\pi}{2}$$

$$\therefore \text{principal arg}(w) = -\frac{\pi}{2}$$

$$10(b) \therefore w = 512 \operatorname{cis}\left(-\frac{\pi}{2}\right)$$

$$= 512 \cos\left(-\frac{\pi}{2}\right) + 512 \sin\left(-\frac{\pi}{2}\right)i$$

$$= 0 - 512i$$

$$= -512i$$