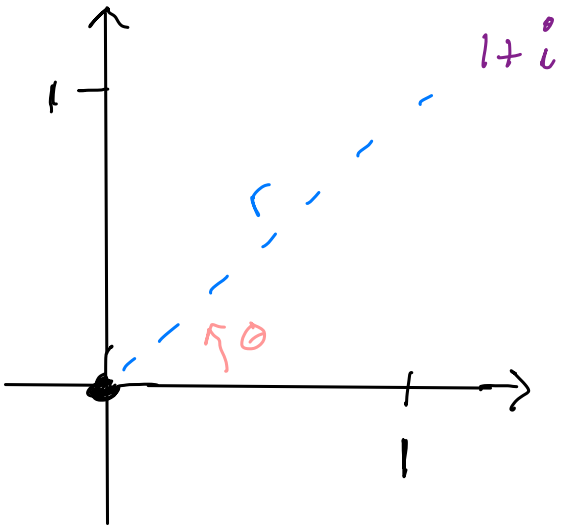
You are **strongly** encouraged to work in groups, following the procedure as in homework MS09.

Exercise pCA 1. Express the given complex number in the form $a + ib$ with $a, b \in \mathbb{R}$.

ER 1.a. $(1+i)^{20}$. Hint. Express $(1+i)$ as $re^{i\theta}$.

ER 1.b. $\dfrac{1-2i}{2+i}$. Hint. Multiply the numerator and denumerator by the *complex conjugate of* $2+i$, which is $2-i$.

(a) Note $1+i = 1+1i$ so we view $1+i \in \mathbb{C}$ as the point $(1,1) \in \mathbb{R}^2$.



$r = \sqrt{1^2+1^2} = \sqrt{2}$

$\theta = \pi/4$.

So

$$1+i \;=\; \sqrt{2}e^{i\pi/4} \overset{\text{note}}{=} \sqrt{2}\,[\cos(\pi/4) + i\sin(\pi/4)] \;.$$

So

$$(1+i)^{20} = (\sqrt{2}e^{i\pi/4})^{20} = (\sqrt{2})^{20}e^{i5\pi} = 2^{10}e^{i\pi} = \boxed{-2^{10}} \overset{\text{or}}{=} \boxed{-1024}.$$

(b) Multiplying the numerator and denominator by $2-i$, the complex conjugate of $2+i$, we get

$$\frac{1-2i}{2+i}\cdot\frac{2-i}{2-i} = \frac{2-2+(-4-1)i}{2^2+1^2} = \frac{0-5i}{5} = \boxed{-i}.$$