Complex Numbers

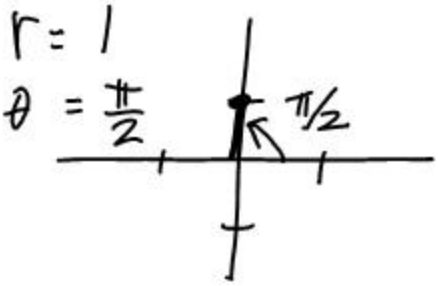
Cartesian Form: $a+bi$ $\quad 2-5i$

Modulus-Argument Form: $r\,\mathrm{cis}\,\theta$

Euler Form: $re^{i\theta}$

$$3\,\mathrm{cis}\,\frac{\pi}{2} = 3e^{i\cdot\frac{\pi}{2}}$$

Ex. Write i in Euler form.



$$1\,\mathrm{cis}\,\frac{\pi}{2} = e^{i\cdot\pi/2}$$

Ex. Evaluate i^i

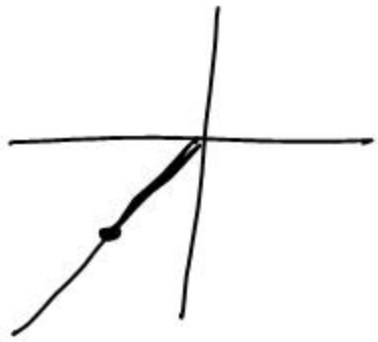
$$i^i = \left(e^{i\cdot\pi/2}\right)^i = \underbrace{e^{-\pi/2}}_{\text{real number}}$$

$$(1+i)^{-3} = \left(\sqrt{2}\,\mathrm{cis}\,\tfrac{\pi}{4}\right)^{-3}$$ ← DeMoivre's Thm

$$= \left(\sqrt{2}\right)^{-3} \cdot \mathrm{cis}\left(\tfrac{-3\pi}{4}\right)$$

$$= \frac{1}{2\sqrt{2}}\,\mathrm{cis}\,\tfrac{5\pi}{4}$$

$$\approx 0.35\,\mathrm{cis}\,\tfrac{5\pi}{4}$$



$$(1+i)^8 = \left(\sqrt{2}\right)^8 \mathrm{cis}\,\tfrac{8\pi}{4}$$

$$= 16\,\mathrm{cis}\,0$$

count each circle as 2

$(1+i)^n$ Name _____