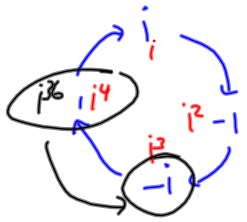
Powers of i

$i^{35} = ?$

$= -i$

$i = i$
$i^2 = -1$
$i^3 = -i$
$i^4 = 1$



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modulus?

$z = 2 - 3i$

$|z| = ?$

(+)

$|z| = \sqrt{2^2 + 3^2} = \sqrt{4+9} = \sqrt{13}$

$z = 3 + 2i$

Conjugate: $\bar{z} = 3 - 2i$

$z \cdot \bar{z} = 3^2 - (2i)^2$

DOTS $= 9 \pm 4i^2$

$= 13$

Multiplying by conjugates gives us a real number

POLAR FORM

Example 2

Express $(-1 + i\sqrt{3})$ in the form $r(\cos\theta + i\sin\theta)$.

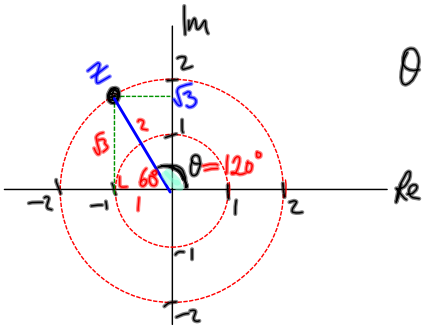
$=z$

Modulus ?

$|z| = \sqrt{a^2+b^2}$

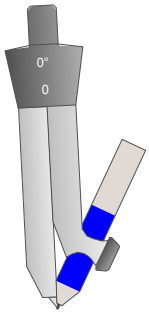
argument

$|-1+i\sqrt{3}| = \sqrt{1^2+\sqrt{3}^2} = \sqrt{1+3} = 2$



$\theta = 120° = \frac{2}{3}\pi$

$z = r\,\mathrm{CiS}\theta \Rightarrow z = 2\left[\cos\frac{2\pi}{3} + i\sin\frac{2\pi}{3}\right]$

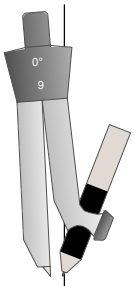


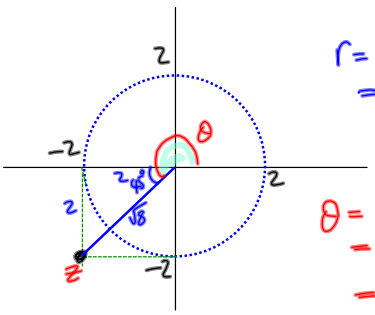
Expand $(-2-2i)^5$ let $z = -2-2i$

① write in polar form

$r = \sqrt{a^2+b^2}$

$\theta = ?$





$r = \sqrt{2^2+2^2} = \sqrt{4+4} = \sqrt{8}$

$\theta = 180° + 45° = 225° = \frac{5\pi}{4}$

$z = \sqrt{8}\,\mathrm{CiS}\frac{5\pi}{4}$

② de Moivre

$[r\mathrm{CiS}\theta]^n = r^n[\mathrm{CiS}n\theta]$

$z^5 = \sqrt{8}^5\,\mathrm{CiS}\,5\left(\frac{5\pi}{4}\right)$

$= \sqrt{8}^5\,\mathrm{CiS}\left(\frac{25\pi}{4}\right)$