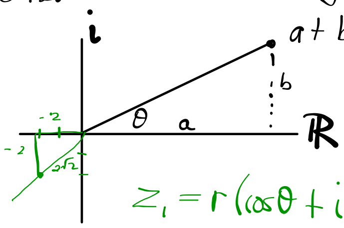
$3+2i$

Rectangular form: $a+bi$

Modulus: $r=|a+bi|=\sqrt{a^2+b^2}$

$\theta=\tan^{-1}\left(\frac{b}{a}\right)$ Argument



$z_1=r(\cos\theta+i\sin\theta)=r\,\text{cis}\,\theta$

$z=-2-2i \quad r=2\sqrt{2} \quad \theta=225°$

$z=2\sqrt{2}\,\text{cis}\,225°$ Polar or Trig

$z_1z_2=r_1r_2\left(\cos(\theta_1+\theta_2)+i\sin(\theta_1+\theta_2)\right)$

$z_1=-2-2i=2\sqrt{2}\,\text{cis}\,225°$

$z_2=1+\sqrt{3}i=2\,\text{cis}\,60°$

$\overset{r_1}{2}(\overset{r_2}{2\sqrt{2}})\,\text{cis}\,\overset{\theta_1+\theta_2}{285°}$

$4\sqrt{2}$

$\approx 1.46-5.46i$

$(-2-2i)(1+\sqrt{3}i)$

$-2-2i-2\sqrt{3}i+2\sqrt{3}i^2$

$2(-1+\sqrt{3})-2i(1+\sqrt{3})$

$\frac{z_1}{z_2}=\frac{r_1}{r_2}\,\text{cis}(\theta_1-\theta_2)$

Nov 12-8:20 AM

$\frac{3+3i}{1-\sqrt{3}i}$

$z_1=3\sqrt{2}(\cos\pi/4+i\sin\pi/4)$

$z_2=2(\cos 5\pi/3+i\sin\frac{5\pi}{3})$

$\tan^{-1}\left(\frac{-\sqrt{3}}{1}\right)$

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

$\frac{z_1}{z_2}=\frac{3\sqrt{2}}{2}\,\text{cis}\left(\frac{\pi}{4}-\frac{5\pi}{3}\right)$ $\quad 45°-300°$ $\quad 105°$

$x\sqrt{2}$, x, x

$=\frac{3\sqrt{2}}{2}\,\text{cis}\left(-\frac{17\pi}{12}\right)$

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

$\tan^{-1}\left(\frac{-\sqrt{3}}{1}\right)$

$=\frac{3\sqrt{2}}{2}\,\text{cis}\left(7\pi/12\right)$

$\cos\frac{\theta}{2}=\sqrt{\frac{1+\cos\theta}{2}}$

$-.549+2.05i$

$\frac{3\sqrt{2}}{2}\sqrt{\frac{1-\frac{\sqrt{3}}{2}}{2}}$

$\frac{3\sqrt{2}}{2}\sqrt{\frac{2-\sqrt{3}}{4}}$

$\frac{(3+3i)(1+\sqrt{3}i)}{(1-\sqrt{3}i)(1+\sqrt{3}i)}$

$\frac{3+3\sqrt{3}i+3i+3\sqrt{3}i^2}{1-3i^2}=\frac{3(1-\sqrt{3})+3i(1+\sqrt{3})}{4}$

Nov 12-8:34 AM

$\frac{4i}{-1+i}=2-2i$

4, $90°$

DeMoivre

$\frac{4\cos 90°}{\sqrt{2}\cos 135°}$

$\sqrt{(-1)^2+1^2}$

$\frac{z_1}{z_2}\ \frac{4}{\sqrt{2}}\,\text{cis}(-45°)$

$2\sqrt{2}\left(\frac{\sqrt{2}}{2}-i\frac{\sqrt{2}}{2}\right)$

Nov 12-9:02 AM

$z^3=8$

$a^3-b^3=(a-b)(a^2+ab+b^2)$

$z^3-8=0$

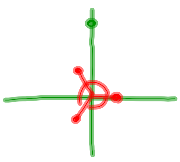
$(a-b)^3 \quad a^3-3a^2b+3ab^2-b^3$

$(z-2)(z^2+2z+4)=0$

$z=2$

$z=\frac{-2\pm\sqrt{4-16}}{2}$

$=\frac{-2\pm2\sqrt{3}i}{2}=-1\pm\sqrt{3}i$



Nov 12-9:15 AM

$$\sqrt[n]{z} = \sqrt[n]{r}\ \text{cis}\left(\frac{\theta + \overset{360k}{2\pi k}}{n}\right)$$

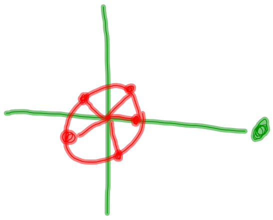
$\theta = 0°$ $k = 0, 1, 2 \ldots n-1$

$\sqrt[3]{8} = \sqrt[3]{8}\ \text{cis}\left(\frac{0°}{3}\right)$ $2(1+0i) = 2$ $\theta = 0°$

$= 2\,\text{cis}\left(\frac{0+360}{3}\right)$ $2\left(-\frac{1}{2} + \frac{\sqrt{3}}{2}i\right) = -1 + \sqrt{3}i$

$= 2\,\text{cis}\left(\frac{0+720}{3}\right)$ $2\left(-\frac{1}{2} - \frac{\sqrt{3}}{2}i\right) = -1 - \sqrt{3}i$

$z^5 = 32$



Nov 12-9:37 AM

82, 132, 140, 146

158-159

Nov 12-9:48 AM

$(2-2i)^3$

$1(2)^3 + 3(2)^2(-2i) + 3(2)(-2i)^2 + 1(-2i)^3$

$8 - 24i + 24i^2 - 8i^3$

$8 - 24i - 24 + 8i = -16 - 16i$

$(2-2i)^3 = -16-16i$ $z^n = r^n\,\text{cis}(n\theta)$

$z_1 = 2\sqrt{2}$ $\theta = 315°$ $(2\sqrt{2})^3\ \text{cis}\,945°$

$2^3 = 8$ $\sqrt{2}^3 = 2\sqrt{2}$ $16\sqrt{2}\left(-\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2}i\right)$

$\sqrt{2}\sqrt{2}\sqrt{2}$

$-16 - 16i$

Nov 12-12:31 PM

$(2+2i)^8$ $2^8\sqrt{2}^8$

$r = 2\sqrt{2}$ $\theta = 45°$ $\left((\sqrt{2})^2\right)^4$

$z = 2\sqrt{2}\ \text{cis}\,45°$ 2^4

$z^8 = (2\sqrt{2})^8\ \text{cis}(8 \cdot 45)$

$256 \cdot 16\ \text{cis}\,360°$

$4096\ \text{cis}\,360° = 4096 + 0i$

$4096(\cos 360° + i\sin 360°)$

$1 + 0i$

Nov 12-12:46 PM

$(\sqrt{3}+i)^6$ $(-1+i)^{20}$

Nov 12-12:51 PM

$Z^3=8$ $z=2$ $a^3-b^3=(a-b)(a^2+ab+b^2)$

$Z^3-8=0$ $(a-b)^3=a^3-3a^2b+3ab^2+b^3$

$(z-2)(z^2+2z+4)=0$

$z=2$ $z=\frac{-2\pm\sqrt{4-16}}{2}=\frac{-2\pm\sqrt{-12}}{2}$

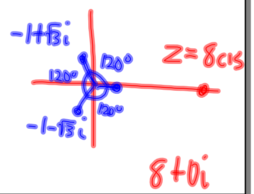
$-1\pm\sqrt{3}i=\frac{-2\pm2\sqrt{3}i}{2}$

a^2+ab+b^2

$a-b$

$-\cancel{a^2b}-\cancel{ab^2}-b^3$

$a^3+\cancel{a^2b}+\cancel{ab^2}$



Nov 12-1:29 PM

Nov 12-1:54 PM