Determine valores de z tales que $z^3 = i - 1$ y representelos graficamente

$z^3 = i - 1$

$z^3 = -1 + i$

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

$\theta = \arctan\left(\frac{-1}{1}\right) + \pi = \frac{3\pi}{4}$

$z = \sqrt{2} \cdot \text{cis}\left(\frac{3\pi}{4}\right)$

$z^3 = \sqrt{2}\ \text{cis}\left(\frac{3\pi}{4}\right)$

$z = \sqrt[3]{\sqrt{2}} \cdot \text{cis}\left(\dfrac{\frac{3\pi}{4} + 2\pi k}{3}\right), \quad k = 0, 1, 2$

$k = 0 \rightarrow \quad \sqrt[6]{2} \cdot \text{cis}\left(\dfrac{\frac{3\pi}{4} + 2\pi \cdot 0}{3}\right)$

$z_1 = \sqrt[6]{2} \cdot \text{cis}\left(\frac{\pi}{4}\right)$

$\sqrt[6]{2} \cdot \left[\cos\left(\frac{\pi}{4}\right) + i \,\text{sen}\left(\frac{\pi}{4}\right)\right]$

Cordenada 1 = $\boxed{0,7937 + 0,7937i}$

$k = 0 \rightarrow \quad \sqrt[6]{2} \cdot \text{cis}\left(\dfrac{\frac{3\pi}{4} + 2\pi \cdot 1}{3}\right)$

$z_2 = \sqrt[6]{2}\ \text{cis}\left(\frac{11\pi}{12}\right)$

$\sqrt[6]{2} \cdot \left[\cos\left(\frac{11\pi}{12}\right) + i \,\text{sen}\left(\frac{11\pi}{12}\right)\right]$

Cordenada 2: $\boxed{-1,0842 + 0,2905i}$

$k=2 \rightarrow \sqrt[6]{2} \cdot \text{Cis}\left(\dfrac{\frac{3\pi}{4} + 2\pi \cdot 2}{3}\right)$

$\sqrt[6]{2} \cdot \text{Cis}\left(\frac{19\pi}{12}\right)$

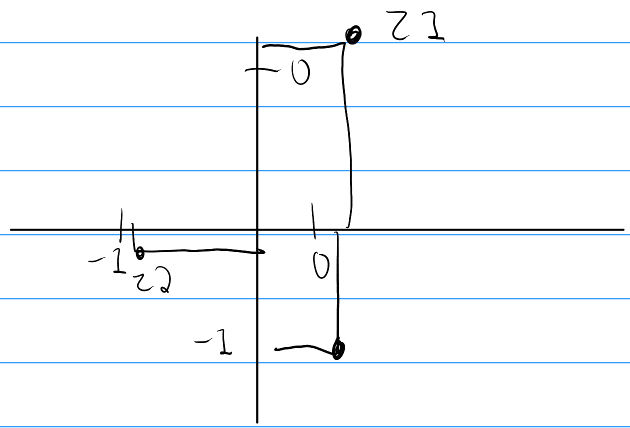
$\sqrt[6]{2} \cdot \left[\cos\left(\frac{19\pi}{12}\right) + i\,\text{sen}\left(\frac{19\pi}{12}\right)\right]$

Cordenada 3: $\boxed{0{,}29051 - 1{,}0842i}$

Cordenada 1 = $\boxed{0{,}7937 + 0{,}7937i}$

Cordenada 2: $\boxed{-1{,}0842 + 0{,}2905i}$

Cordenada 3: $\boxed{0{,}29051 - 1{,}0842i}$



Sea $p(x) = x^3 - ax^2 + x - a$, se sabe que i es raíz doble de $p(x)$, hallar valor de a

$$x^3 \quad -ax \quad +x \quad -a$$

$$\begin{array}{cccc|c} 1 & -a & 1 & -a & i \\ & i & -ai-1 & a & \\ \hline 1 & -a+i & -ai & 0 & (x-i) \end{array}$$

$$x^2 + (-a+i)x + (-ai)$$

$$\begin{array}{ccc|c} 1 & -a+i & -ai & -i \\ & -i & ai & \\ \hline 1 & -a & 0 & (x-(-i)) \\ & & & (x+i) \end{array}$$

$$(x-a)$$

$$(x-i)\,(x+i)\,(x-a) \qquad\qquad (x-i)^2 = (x-i)(x-i)$$

$$x=i \qquad x=-i \qquad x=a$$

$$a = i$$

Sean $z = 2 + abi$ y $w = 2a - b + 3i$

¿Cual debe ser la relacion entre los numeros reales a y b para que $\mathrm{Re}(zw) = 0$?

$$z \cdot w = (2 + abi)(2a - b + 3i)$$

$$4a - 2b + 6i + 2a^2bi - ab^2i + 3abi^2$$

$$4a - 2b + 6i + 2a^2bi - ab^2i - 3ab$$

$$z \cdot w \quad (4a - 2b - 3ab) + (2a^2b + b + - ab^2)i$$

$$\mathrm{R}(z \cdot w) = 4a - 2b - 3ab = 0$$

$$4a - 3ab = 2b$$

$$a(4 - 3b) = 2b$$

$$\boxed{a = \frac{2b}{4 - 3b}}$$

Forma rectangular de w, donde

$w + e^{i} = 2\ln(1-i)$

$w = 2\ln(1-i) - e^{i}$

$z = 1 - i \quad a = 1 \quad b = -1$

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

$\theta = \arctan\left(\frac{-1}{1}\right) = -\frac{\pi}{4}$

$z = \sqrt{2} \cdot e^{-\frac{\pi}{4} i}$

$2\ln\left(\sqrt{2} \cdot e^{-\frac{\pi}{4} i}\right) - e^{i}$

$2\left[\ln(\sqrt{2}) + \cancel{\ln}(\cancel{e})^{-\frac{\pi}{4} i}\right] - e^{i}$

$2\ln(\sqrt{2}) - \cancel{2}\frac{\pi}{\cancel{4}} i - e^{i}$

$2\ln(2)^{\frac{1}{2}} - \frac{\pi}{2} i - e^{i}$

Sen, cos $-1 \leq \theta \leq 1$

$\cancel{2} \cdot \frac{1}{\cancel{2}} \ln(2) - \frac{\pi}{2} i - e^{i}$

$\ln(2) - \frac{\pi}{2} i - e^{i \cdot 1}$

$\ln(2) - \frac{\pi}{2} i - [\operatorname{cis}(1)]$

$\ln(2) - \frac{\pi}{2} i - [\cos(1) + i\,\operatorname{sen}(1)]$

$\ln(2) - \frac{\pi}{2} i - \cos(1) - i\,\operatorname{sen}(1)$

$\{\ln(2) - \cos(1)\} + \{-\frac{\pi}{2} - \operatorname{sen}(1)\} i$

$e^{(\ln(2) - \cos(1))} \cdot \operatorname{cis}\left(\frac{-\pi}{2} - \operatorname{sen}(1)\right)$

$e^{[\ln(2) - \cos(1)]} \cdot \cos\left(\frac{-\pi}{2} - \operatorname{sen}(1)\right) +$

$e^{[\ln(2) - \cos(1)]} \cdot \operatorname{sen}\left(\frac{-\pi}{2} - \operatorname{sen}(1)\right)$

Sea $a \in \mathbb{R}$, $a \neq 0$, Determine

$(A \cdot B)^T + 5 \cdot C^{-1}$ si se tiene que

$$A = \begin{pmatrix} -1 & 0 \\ 2 & 3 \\ 1 & 1 \end{pmatrix}, \quad B = \begin{pmatrix} 0 & 2 & \frac{-3}{a} \\ 1 & -3 & \frac{-1}{a} \end{pmatrix}, \quad C = \begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & -2a \\ 0 & 1 & a \end{pmatrix}$$

$$A \cdot B = \begin{pmatrix} -1 \cdot 0 + 0 \cdot 1 & -1 \cdot 2 + 0 \cdot -3 & \frac{3}{a} + 0 \cdot \frac{-1}{a} \\ 2 \cdot 0 + 3 \cdot 1 & 2 \cdot 2 + 3 \cdot -3 & 2 \cdot \frac{-3}{a} + 3 \cdot \frac{-1}{a} \\ 1 \cdot 0 + 1 \cdot 1 & 1 \cdot 2 + 1 \cdot -3 & \frac{-3}{a} - \frac{1}{a} \end{pmatrix}$$

$$A \cdot B = \begin{pmatrix} 0 & -2 & \frac{3}{a} \\ 3 & -5 & \frac{-9}{a} \\ 1 & -1 & \frac{-4}{a} \end{pmatrix}$$

$$(A \cdot B)^T = \begin{pmatrix} 0 & 3 & 1 \\ -2 & -5 & -1 \\ \frac{3}{a} & \frac{-9}{a} & \frac{-4}{a} \end{pmatrix}$$

$$C = \begin{pmatrix} 0 & 0 & 1 \\ 1 & 0 & -2a \\ 0 & 1 & a \end{pmatrix}$$

$$C^{-1} = \left(\begin{array}{ccc|ccc} 0 & 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & -2a & 0 & 1 & 0 \\ 0 & 1 & a & 0 & 0 & 1 \end{array}\right)$$

1) $F1 \leftrightarrow F2$
2) $F2 \leftrightarrow F3$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & -2a & 0 & 1 & 0 \\ 0 & 1 & a & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 & 0 \end{array}\right)$$

$2a \cdot F3 + \widetilde{F1}$
$-a \cdot F3 + \widetilde{F2}$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & 0 & 2a & 1 & 0 \\ 0 & 1 & 0 & -a & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 & 0 \end{array}\right) \qquad \begin{matrix} 0 \\ 0 \\ 1 \end{matrix}$$

$$C^{-1} = \begin{pmatrix} 2a & 1 & 0 \\ -a & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$$

$$5 \cdot C^{-1} = 5 \begin{pmatrix} 2a & 1 & 0 \\ -a & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$$

$$5 \cdot C^{-1} = \begin{pmatrix} 10a & 5 & 0 \\ -5a & 0 & 5 \\ 5 & 0 & 0 \end{pmatrix}$$

$$(A \cdot B)^T + 5 \cdot C^{-1}$$

$$(A \cdot B)^T = \begin{pmatrix} 0 & 3 & 1 \\ -2 & -5 & -1 \\ \frac{3}{a} & \frac{-9}{a} & \frac{-9}{a} \end{pmatrix} \quad 5 \cdot C^{-1} = \begin{pmatrix} 10a & 5 & 0 \\ -5a & 0 & 5 \\ 5 & 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 0 & 3 & 1 \\ -2 & -5 & -1 \\ \frac{3}{a} & \frac{-9}{a} & \frac{-9}{a} \end{pmatrix} + \begin{pmatrix} 10a & 5 & 0 \\ -5a & 0 & 5 \\ 5 & 0 & 0 \end{pmatrix}$$

$$\boxed{\begin{pmatrix} 10a & 8 & 1 \\ -2-5a & -5 & 4 \\ \frac{3}{a}+5 & \frac{-9}{a} & \frac{-9}{a} \end{pmatrix}}$$