$$\frac{4}{(x+3)\underbrace{(x^2-4)}_{\substack{2\\-2}}} = \frac{4}{(x+3)(x-2)(x+2)} =$$

| | 1 | -1 | -1 | 1 |
|---|---|---|---|---|
| 1 | | 1 | 0 | -1 |
| | 1 | 0 | -1 | 0 |

$1$
$-1$

$$\boxed{x^3-x^2-x+1} = (x-1)(x^2-1)$$

$$= (x-1)(x-1)(x+1)$$

$$= \underbrace{(x-1)^2}(x+1)$$

$$\boxed{\frac{x-2 \cancel{(x+1)}}{x^3-x^2-x+1}} = \frac{A^{\cancel{(x+1)}}}{\cancel{x+1}} + \boxed{\frac{B^{(x+1)}}{x-1}} + \boxed{\frac{C^{(x+1)}}{(x-1)^2}}$$

$$C \mid \cdot (x-1)^2$$

$$\frac{x-2}{x+1} = \frac{A(x-1)^2}{x+1} + B(x-1) + \boxed{C}$$

$$\Big|_{x=1} : \quad \frac{-1}{2} = C$$

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B] $\cdot x$

$$\frac{(x-2)x}{(x-1)^2(x+1)} = \overbrace{\frac{Ax}{x+1}}^{x\to\infty \ \to A} + \overbrace{\frac{Bx}{x-1}}^{x\to\infty \ \to B} + \overbrace{\frac{Cx}{(x-1)^2}}^{x\to\infty \ \to 0}$$

$$\lim_{x\to\infty} \frac{(x-2)x}{(x-1)^2(x+1)} = 0 = A + B$$

A] $\cdot\, x+1$

$$\left.\frac{x-2}{(x-1)^2}\right|_{x=-1} = A = -\frac{3}{4}$$

$B = 3/4$

---

$$\frac{x-3}{(x-2)^3(x+1)} = \frac{A}{x+1} + \frac{B}{x-2} + \frac{C}{(x-2)^2} + \frac{D}{(x-2)^3}$$

$A = \frac{4}{27}$

$D = -1/3 = \frac{-9}{27}$

B] $\cdot x$

$$\overbrace{\frac{(x-3)x}{(x-2)^3(x+1)}}^{x\to\infty \ \to 0} = \overbrace{\frac{Ax}{x+1}}^{\to A} + \overbrace{\frac{Bx}{x-2}}^{\to B} + \overbrace{\frac{Cx}{(x-2)^2}}^{x\to\infty \ \to 0} + \overbrace{\frac{Dx}{(x-2)^3}}^{x\to\infty \ \to 0}$$

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$\Rightarrow 0 = B + A \Rightarrow B = -\frac{4}{27}$

Si $x = 3$

$$0 = \frac{A}{4} + B + C + D$$

$$0 = \frac{1}{27} - \frac{4}{27} + C - \frac{9}{27} \Rightarrow C = \frac{12}{27}$$

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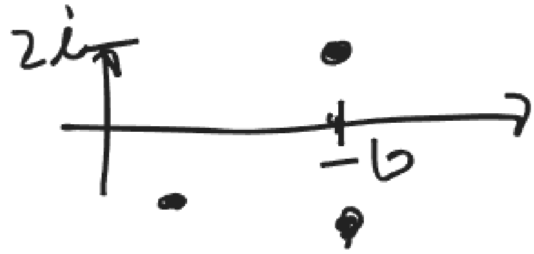
# Raices complejas

Ej:

$$\frac{-b \pm \sqrt{\phantom{x}}}{2a} \quad \boxed{\begin{array}{l} -b + i\sqrt{4} \\ -b - i\sqrt{4} \end{array}}$$




$$\frac{1}{(x-1)(x^2+1)}$$

$(x-1) \rightarrow$ raiz 1

$(x^2+1) \rightarrow +i$, $-i$

$x^2 + 1 = 0$

$x^2 = -1$

$x = \pm\sqrt{-1} = \pm i$

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$$\boxed{\frac{1}{(x-1)(x^2+1)}} = \boxed{\frac{A}{x-1} + \frac{Mx+N}{x^2+1}}, \quad M \in \mathbb{R},\ N \in \mathbb{R}$$

$\boxed{A}\ \cdot x-1$

$$\Big|_{x=1} \Rightarrow A = \frac{1}{2}$$

$\boxed{M \text{ y } N}\ \cdot x^2+1$

$$\frac{1\cancel{(x^2+1)}}{(x-1)\cancel{(x^2+1)}} = \frac{A(x^2+1)}{x-1} + \cancel{\frac{(Mx+N)(x^2+1)}{x^2+1}}$$

$$\frac{1}{x-1} = \frac{A(x^2+1)}{x-1} + Mx+N$$

$$\Big|_{x=i} \quad \boxed{\frac{1}{i-1}} = Mi+N$$

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

$$\frac{-1-i}{(i-1)(-1-i)} = \boxed{\frac{-i-1}{2}} = Mi+N$$

$$-\cancel{i}+1+1+\cancel{i}$$

$$\Rightarrow M = -\frac{1}{2}$$

$$N = -\frac{1}{2}$$

$$z\bar{z} = |z|^2$$

$$\Rightarrow \frac{1}{(x-1)(x^2+1)} = \frac{\frac{1}{2}}{x-1} + \frac{-\frac{1}{2}x - \frac{1}{2}}{x^2+1}$$

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$$\frac{x+2}{\underbrace{(x^2-2x+10)}_{\to\, 1\pm 3i}(x+1)} = \frac{A}{x+1} + \frac{Mx+N}{x^2-2x+10}$$

$\boxed{A}$ $\quad A = \frac{-1}{13}$

$\boxed{M \text{ y } N}$ $\quad \left.\frac{x+2}{x+1}\right|_{\underbrace{x=1+3i}} = Mx+N$

$$\frac{3+3i}{2+3i} = M(1+3i)+N$$

$$\frac{3+3i}{2+3i}\cdot\frac{(2-3i)}{(2-3i)} = M+N+3Mi$$

$$\frac{6-9i+6i+9}{13} = \frac{\overset{Re}{15}\overset{Im}{-3i}}{13} = \overbrace{M+N}^{Re} + \overbrace{3Mi}^{Im}$$

$$\Rightarrow \begin{cases} \frac{15}{13} = M+N \longrightarrow N = \frac{16}{13} \\ -\frac{3}{13} = 3M \Rightarrow M = -\frac{1}{13} \end{cases}$$

$$\Rightarrow \frac{x+2}{(x^2-2x+10)(x+1)} = \frac{\frac{-1}{13}}{x+1} + \frac{\frac{-1}{13}x + \frac{16}{13}}{x^2-2x+10}$$

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