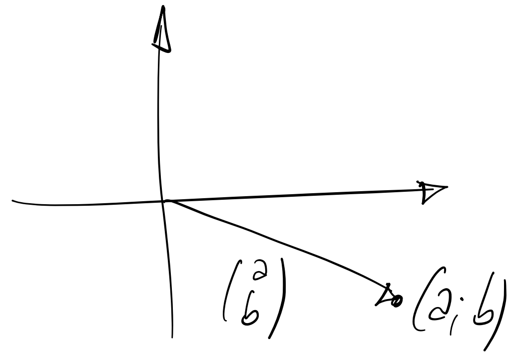
$z \in \mathbb{R}^2$

$z = (a \ \ b)$

$z = \begin{pmatrix} a \\ b \end{pmatrix}$



$z = (a; b) \qquad w = (c; d)$

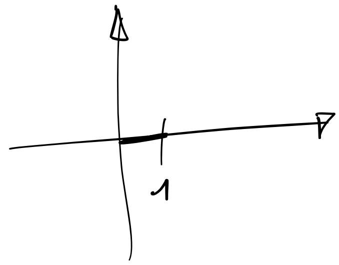
$$\boxed{\begin{aligned} z + w &= (a+c;\ b+d) \\ z \cdot w &= (ac - bd;\ ad + bc) \end{aligned}}$$

$z \cdot w = w \cdot z \qquad (a; b)(c; d) =$

$(c; d)(a; b) = (ca - db;\ cb + da)$

$= (ac - bd;\ ad + bc)$ ✓

$z = (a;b) \qquad w = (c;d)$



$$\boxed{z \cdot w \overset{\text{def}}{=} (ac - bd;\ ad + bc)}$$

vecteur

$z \cdot 1 = z$

$z \cdot w = wz$ ✓

$z \cdot (w \cdot s) = (z \cdot w) \cdot s$ ✓

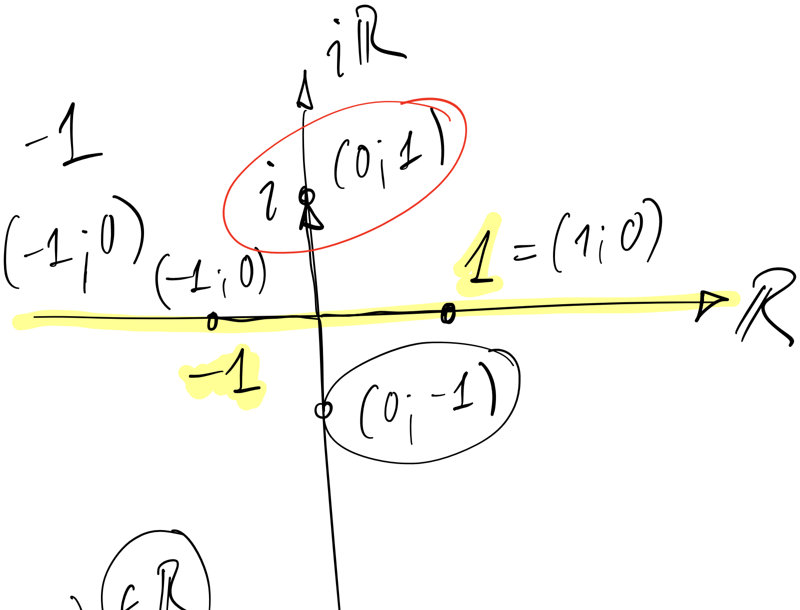
$(a;b) \cdot \underset{(1;0)}{1} = (a;b)$

unité $1 = (1;0)$

$0 = (0;0)$

$i^2 = -1$

$(0;1)^2 = (-1;0)$



$(0;1)^2 = (-1;0)$

$(-1;0)^2 = (1;0)$

$(1;0)^2 = (1;0)$

$(0;-1)^2 = (-1;0)$

$t = (a;0)\ \in \mathbb{R}$

$\mathbb{R} \subset \mathbb{C}$

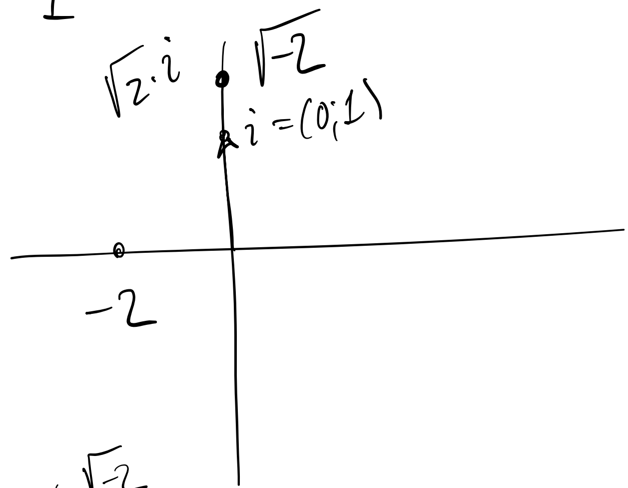
$\pi = (\pi;0)$

$\pi + 0 \cdot i$

$$\sqrt{-2} = \sqrt{(-2;0)}$$

$$= \sqrt{2}\,(0;1) = \sqrt{2} \cdot i$$

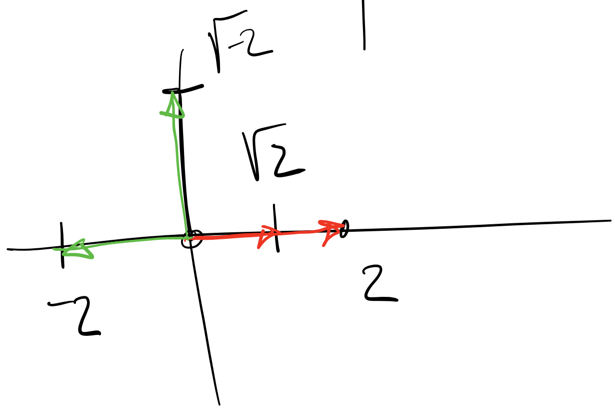
$$(\sqrt{2}\cdot i)^2 = \underbrace{\sqrt{2}\cdot\sqrt{2}}_{2}\cdot\underbrace{i\cdot i}_{-1} = -2$$



$$\sqrt{-2} = \sqrt{2}\cdot i$$

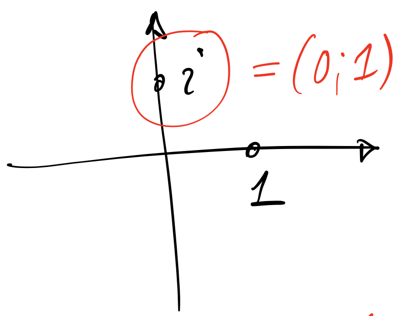
$$a>0 \quad a\in\mathbb{R}$$

$$\sqrt{-a} = \sqrt{a}\cdot i$$



$$\boxed{z = a+bi} = (a;b)$$

$$i^2 = -1$$



$$(a+bi)(c+di) = ac + adi + bci + bd\,\overset{-1}{i^2}$$

$$= (ac-bd) + (ad+bc)i$$

$$(a;b)\cdot(c;d) = (ac-bd\,;\,ad+bc)$$

$$\boxed{\frac{a+bi}{c+di}} \stackrel{?}{=} \frac{a+bi}{c+di}\cdot\frac{1}{1} = \boxed{\frac{a+bi}{c+di}\cdot\frac{c-di}{c-di}} \quad 1$$

$$(c+di)(c-di) = c^2 - d^2 i^2 = c^2 + d^2 \in \mathbb{R}$$

$$\frac{a+bi}{k} = \frac{a}{k} + \frac{b}{k}\cdot i$$

$$\boxed{\frac{(ac+bd)+(bc-ad)\cdot i}{c^2+d^2}} =$$

$$\frac{1}{i} = \frac{\overset{a+bi}{1+0i}}{\underset{c+di}{0+1i}}\cdot\frac{0-1i}{0-1i}$$

$$= \frac{-i}{0^2+1^2} = -i$$

$$\rightarrow \boxed{\frac{ac+bd}{c^2+d^2} + \frac{bc-ad}{c^2+d^2}\, i}$$

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

$$\frac{3+4i}{1-2i}\cdot\frac{1+2i}{1+2i} = \frac{3+6i+4i+8i^2}{(1-2i)(1+2i)} = \frac{-5+10i}{1^2-(2i)^2}$$

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

$$= -1+2i$$

$$(1-2i)(-1+2i) = -1+2i+2i-4i^2 = 4-1+4i = 3+4i$$

$$\frac{3+4i}{1-2i} = -1+2i \quad \Leftrightarrow \quad 3+4i = (\overset{A}{1-2i})(\overset{-A}{-1+2i})$$

$$= -(1-2i)^2$$

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

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

$$\frac{a+bi}{c+di} \cdot \overbrace{\boxed{\frac{c-di}{c-di}}}^{1} = \frac{(a+bi)(c-di)}{c^2+d^2}$$

$$\frac{1}{5-4i} \cdot \frac{5+4i}{5+4i} = \frac{5+4i}{25+16} = \frac{5}{41} + \frac{4}{41} i$$

$$(A-B)(A+B) = A^2 - B^2$$

$$(A-Bi)(A+Bi) = A^2 + B^2$$

$$(5-4i)(5-4i) =$$

$$25 - 20i - 20i + 16i^2 =$$

$$25 - 16 - 40i = 9 - 40i$$

$\boxed{\text{Vendredi 8}}$ 1.1.1 à 1.1.4

$$\frac{3-5i}{10} = 0{,}3 - 0{,}5i$$

$a+bi$

$$\frac{3-5i}{10+i} = \frac{3-5i}{10+i}\cdot\frac{1}{1} = \frac{(3-5i)\cdot(10-i)}{(10+i)(10-i)}$$

1

$$(A+Bi)(A-Bi) = A^2 - (Bi)^2$$
$$= A^2 - B^2\cdot(-1) = A^2+B^2 \in \mathbb{R}$$

$$\frac{30-3i-50i+5i^2}{10^2+1^2} = \frac{25-53i}{11}$$

$$= \frac{25}{11} - \frac{53}{11}i$$