

# Resolver para x

•  $x - 1 = 0$

$x = \underline{1}$  ✓

$1 - 1 = 0$  ✓

•  $\underline{x} + 1 = 0$

$x = \underline{-1}$  ✓

$-1 + 1 = 0$  ✓

③ •  $x^2 - 1 = 0$

$\underline{x = 1}$  ✓

$1^2 - 1 = 1 - 1 = 0$  ✓

$\underline{x = -1}$  ✓

$(-1)^2 - 1 = 1 - 1 = 0$  ✓

•  $\underline{x^2 + 1 = 0}$

~~$\underline{x = -1}$~~

~~$(-1) + 1 = 1 + 1 = 2$~~

④ •  $\underline{x = \sqrt{-1}}$

$(\sqrt{-1}) + 1 = -1 + 1 = 0$

¿Exite un número que al elevarlo al cuadrado nos de negativo?

$$\underline{(-5)^2 = 25}$$

$$(-3)^2 = 9$$

$$\underline{5^2 = 25}$$

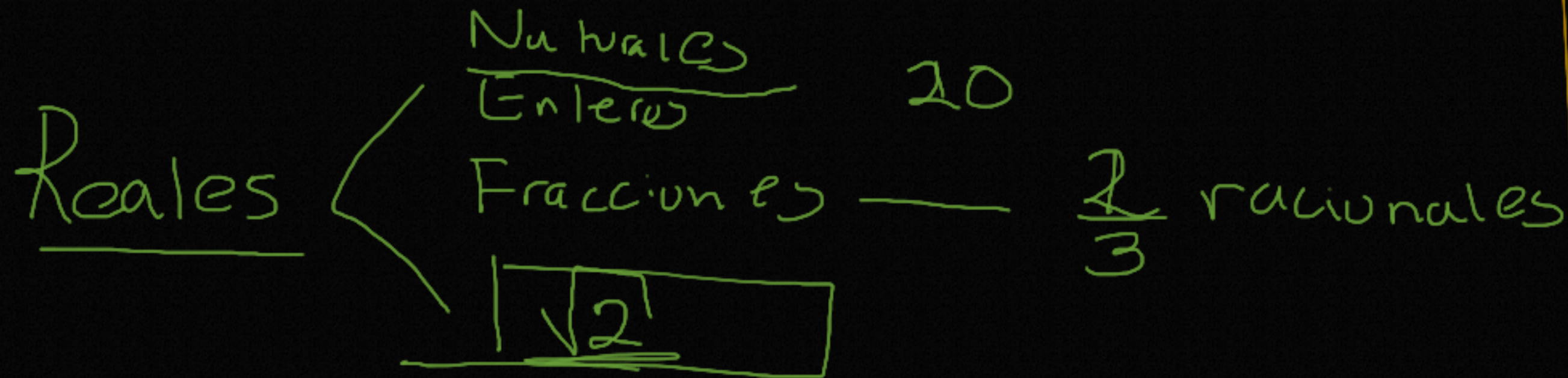
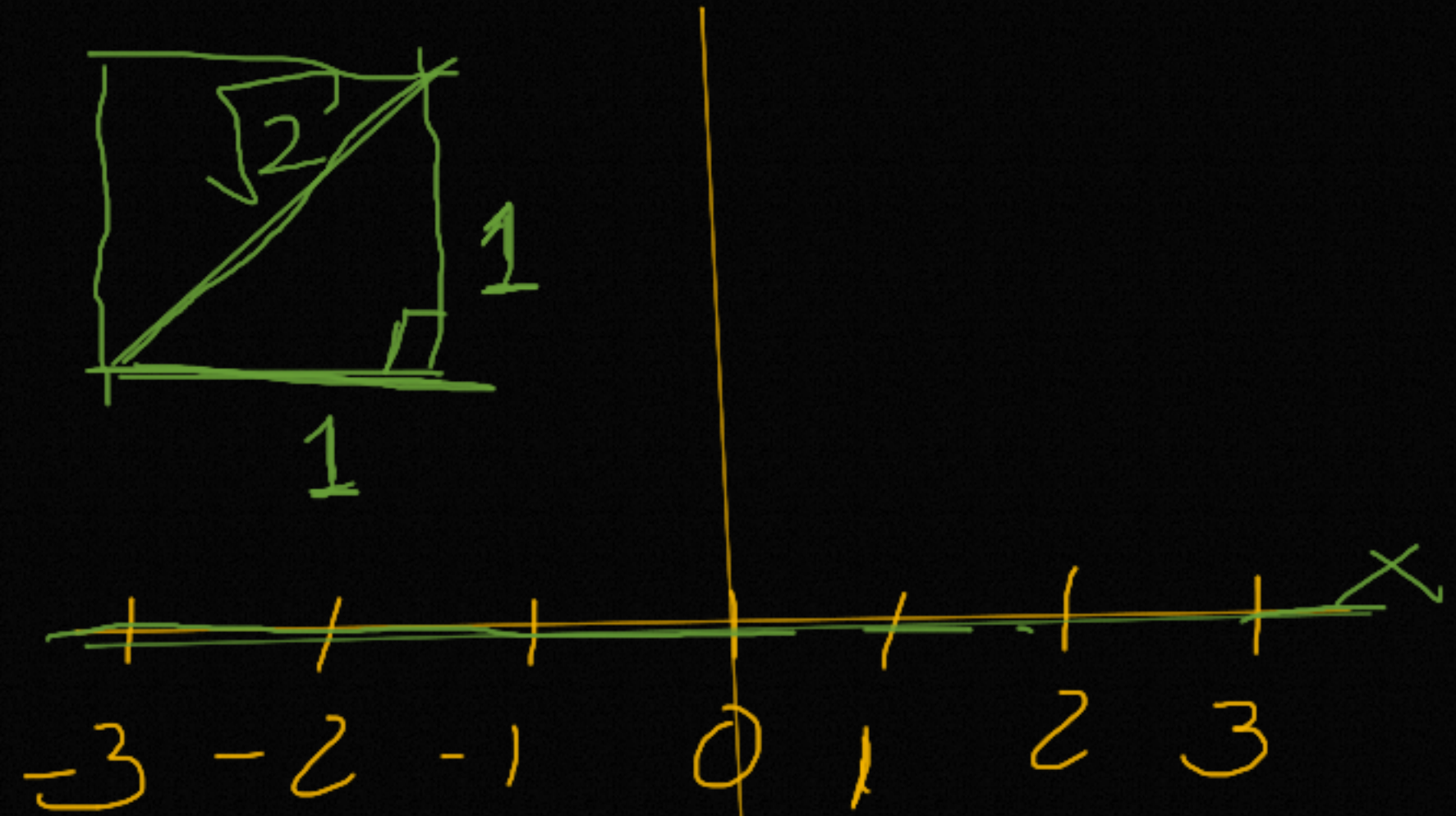
$$3^2 = 9$$

$$\left(-\frac{1}{2}\right)^2 = \frac{1}{4}$$

$$\boxed{i^2 = -1}$$

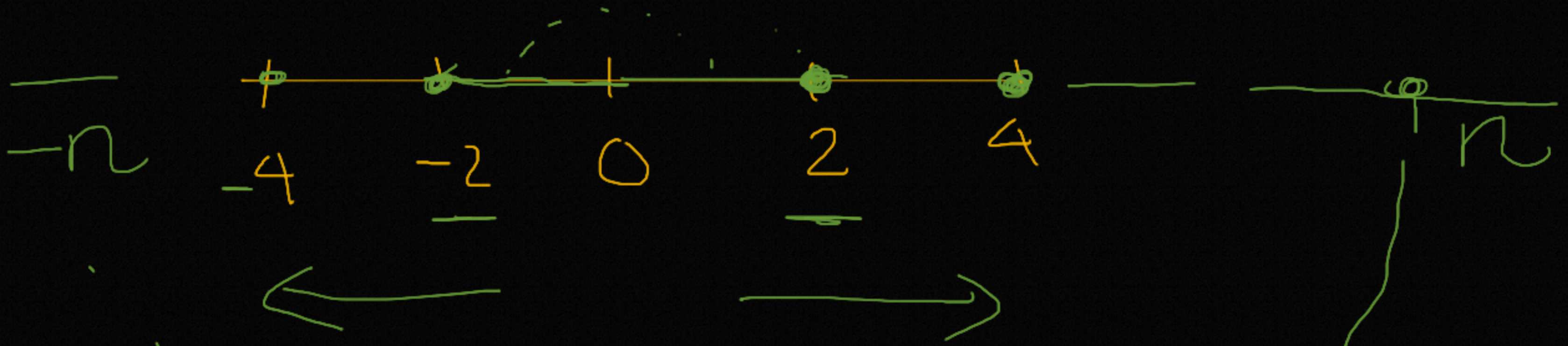
¿Existe un número que al elevarlo al cuadrado nos de negativo?

## Definición



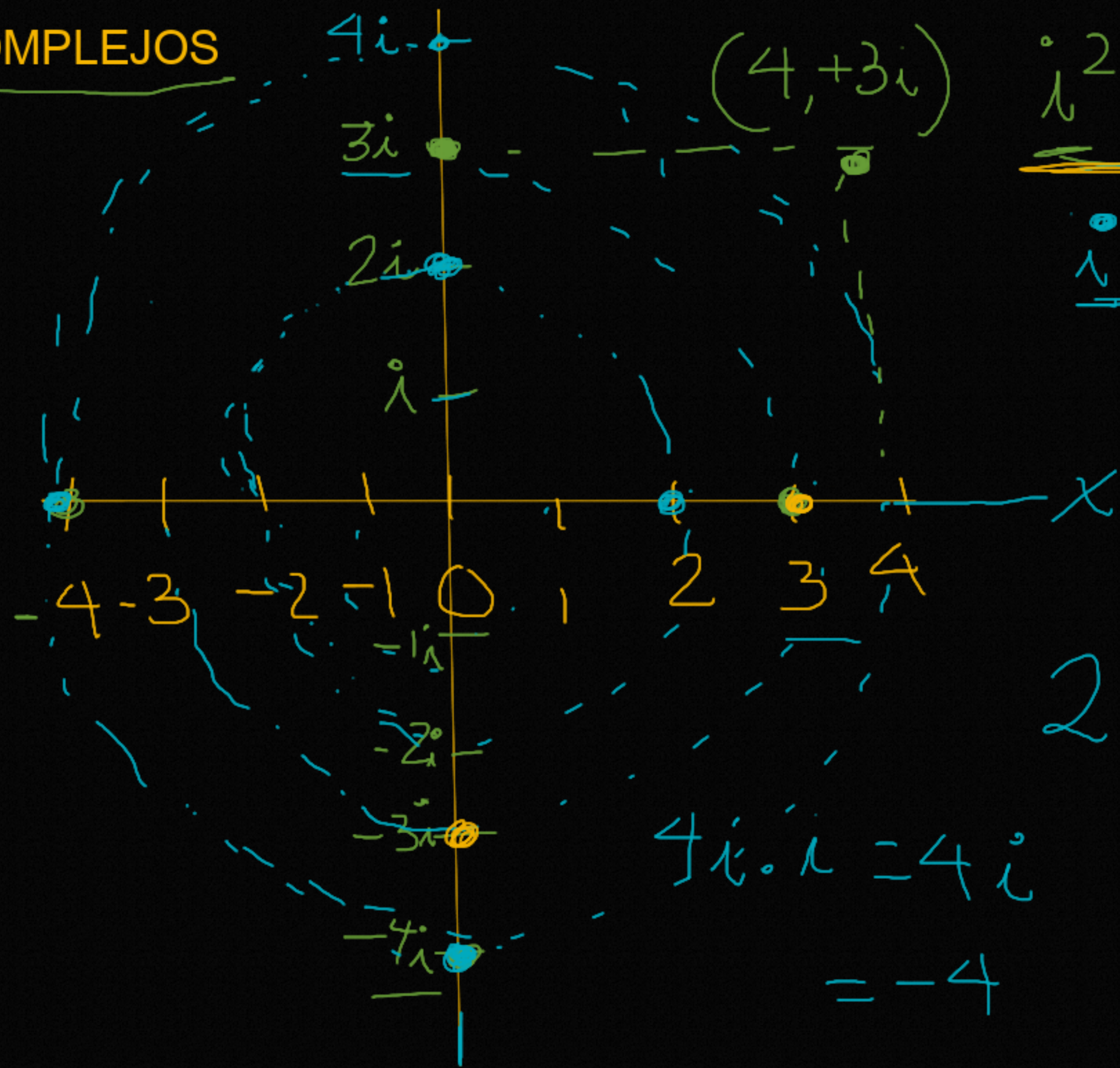
# NÚMEROS COMPLEJOS

(-1)



Rotación 180°

# NÚMEROS COMPLEJOS



$$i^2 = -1$$

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

$$4i \cdot i = 4i^2 = -4(-1) = 4$$

$$2i \cdot i = 2i^2 = -2$$

$$4i \cdot i = 4i^2 = -4$$

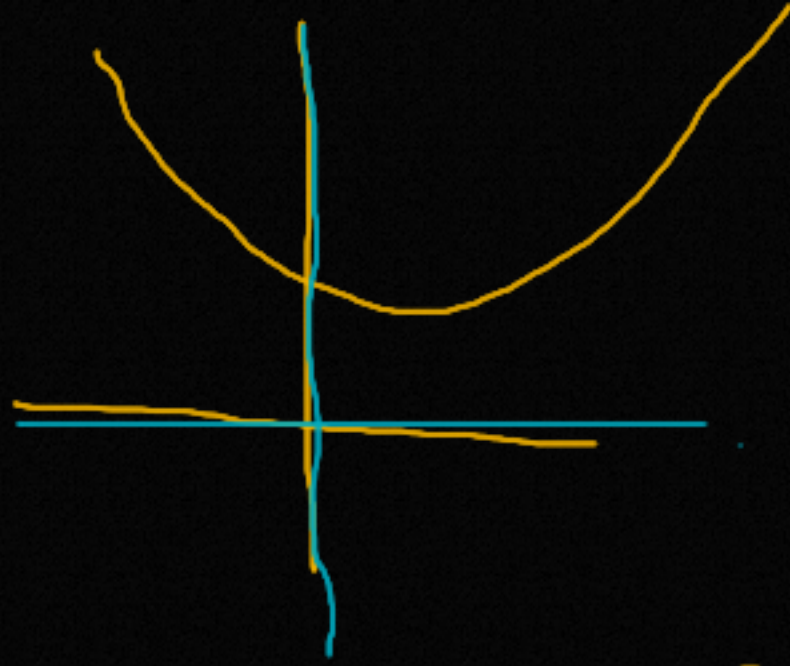
Rotación 90

$$\underline{x}^2 + 1 = 0$$

i es solución

$$(\underline{i})^2 + 1 = -1 + 1 = 0$$

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



$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\underline{x^2 + 2x + 5 = 0}$$

$$\leftarrow \underline{-4(1)(5)}$$

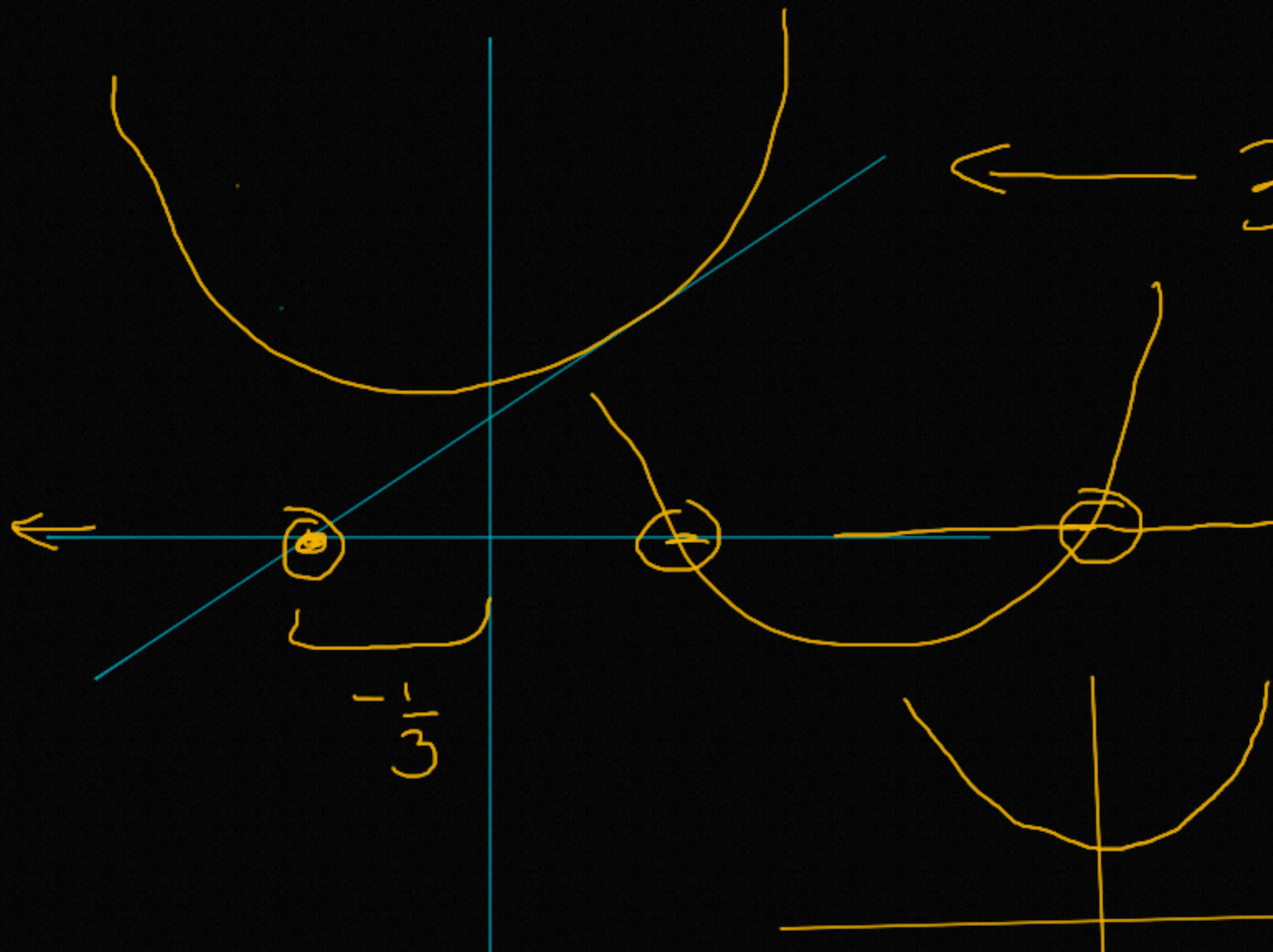
$$x = \frac{-2 \pm \sqrt{4 - 4(5)}}{2} = \frac{-2 \pm \sqrt{-16}}{2}$$

$$i^2 = -1$$

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

$$\sqrt{-16} = \sqrt{4(16)} = \sqrt{-1} \sqrt{16} = \pm 4\sqrt{-1}$$

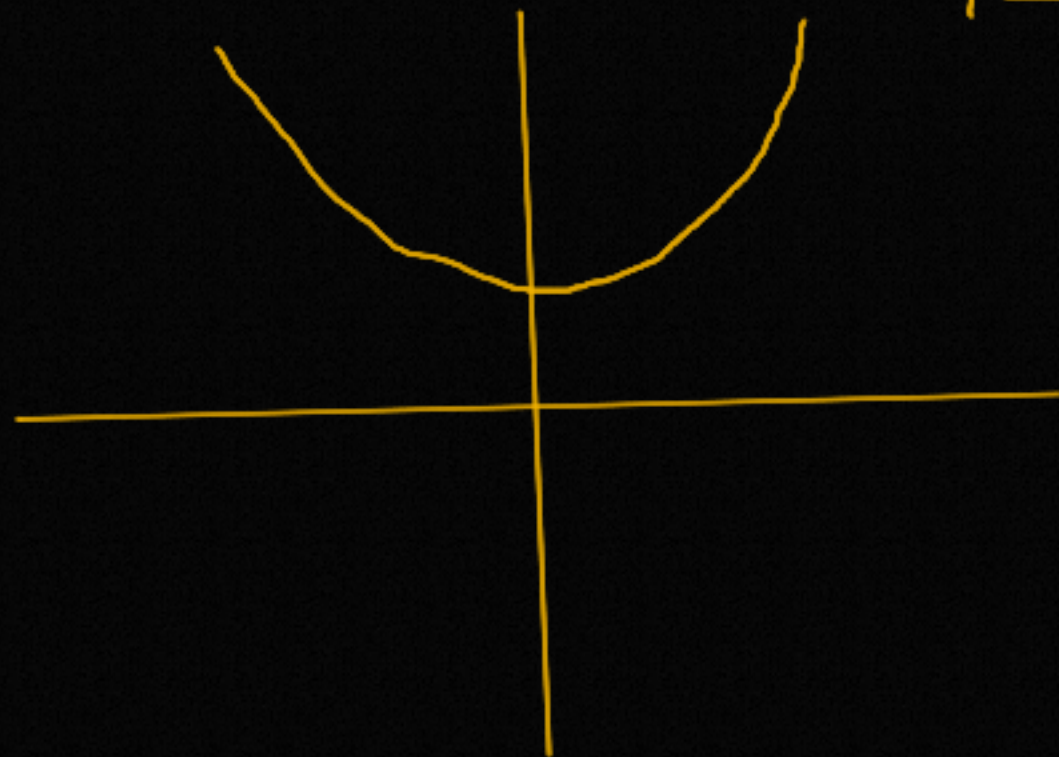
$$\begin{aligned} \frac{-2 \pm 4i}{2} &= \frac{2(-1 \pm 2i)}{2} = -1 \pm 2i \rightarrow \begin{aligned} &= \pm 2i \\ &\frac{-1 + 2i}{-1 - 2i} \end{aligned} \end{aligned}$$



$$\leftarrow 3x + 2 = 1$$

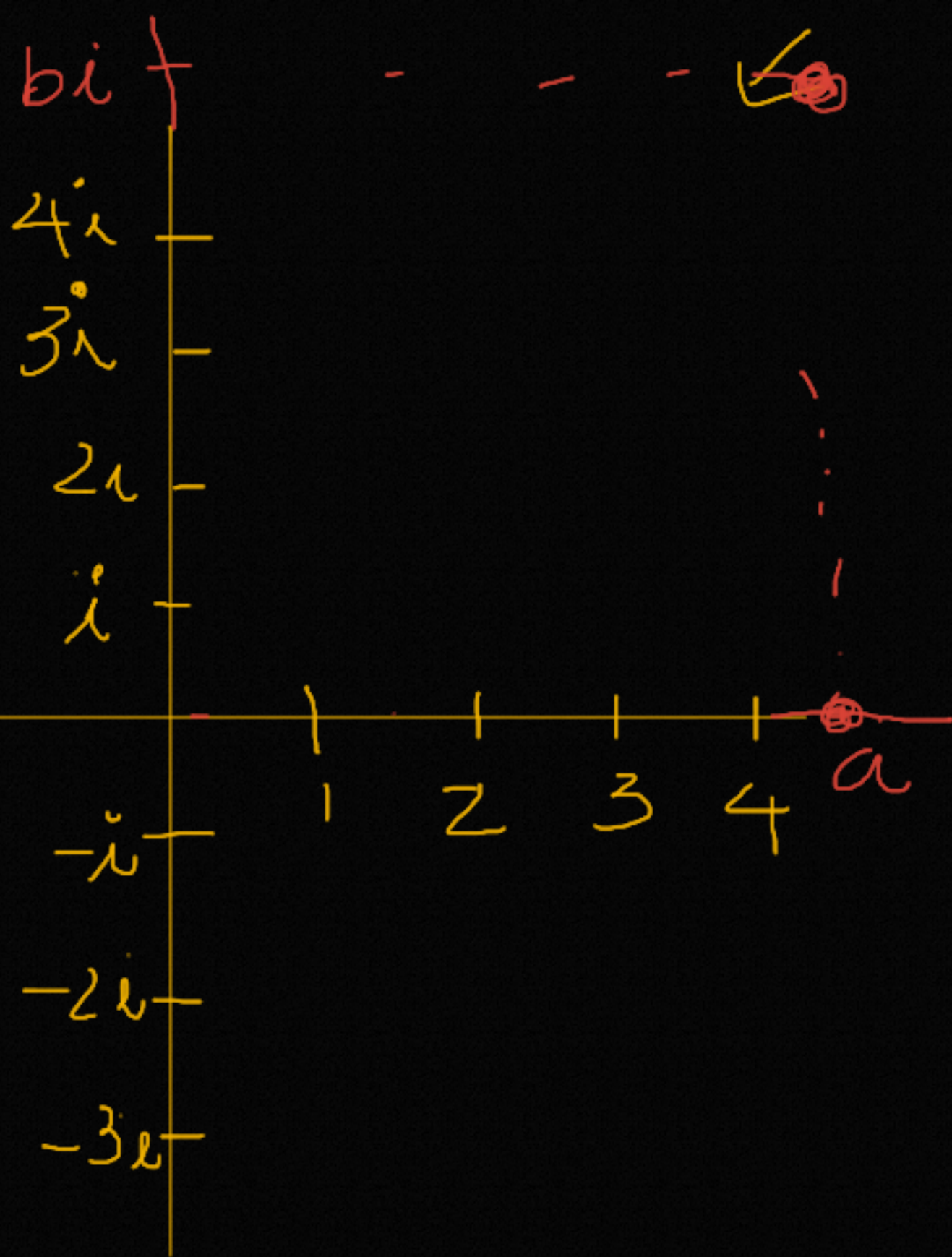
$$3x = -1$$

$$x = -\frac{1}{3}$$



$$x^2 + 1 = 0$$





•  $a+bi$  =  $(a, b)$

$3+2i$   
 [     ] [     ]

$-2+4i$

$-3-3i$

# Suma y resta de complejos ✨

$$\underbrace{(3+4i)} + \underbrace{(-7-20i)} = 10 - 16i$$

$$\underbrace{(3+4i)} - \underbrace{(-7-20i)} = -4 + 24i$$

$4i + 20i$

Multiplicación

$$i^2 = -1$$

$$(3+4i)(7-20i)$$

$$= 21 - 60i + 28i - 80i^2$$

$$= 21 - 32i + 80$$

$$= \underline{101 - 32i}$$

m

$$i^{2k+1}$$

$$i^{13} = i^{12} \cdot i = (i^2)^6 \cdot i$$

$$= (-1)^6 \cdot i = i$$