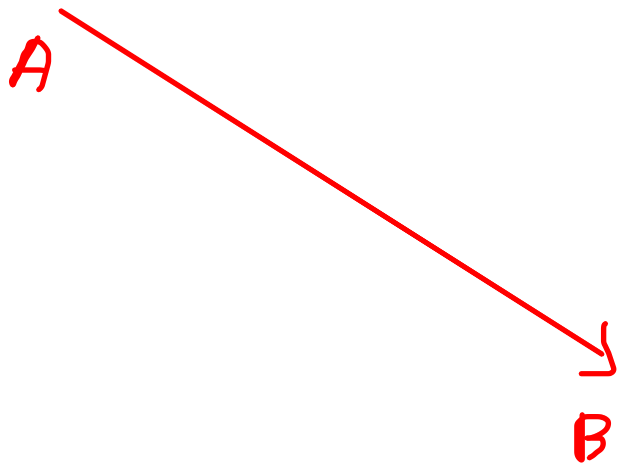
Ejemplos:

$$\vec{u} = (u_1, u_2, \dots, u_n)$$ (n-dimensional)

Se define como el numero de componentes que integran el vector

$$\vec{v} = (1, -1, 4)$$ (3-dimensional)

Magnitud de un vector: Hablamos de magnitud (o norma) de un vector al valor numerico que representa su medida.



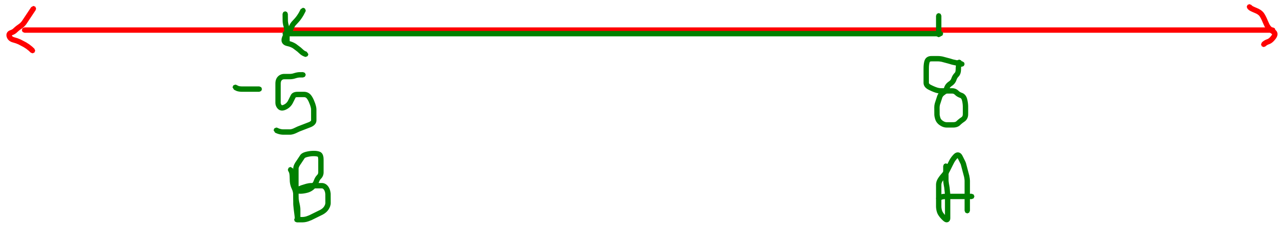
$$\vec{u} = \vec{AB}$$

$$\|\vec{u}\| = \|\vec{AB}\|$$

(Norma en $\mathbb{R}$)

$$\|\vec{AB}\| = |B-A| = |A-B| = \sqrt{(A-B)^2}$$

Ejemplo

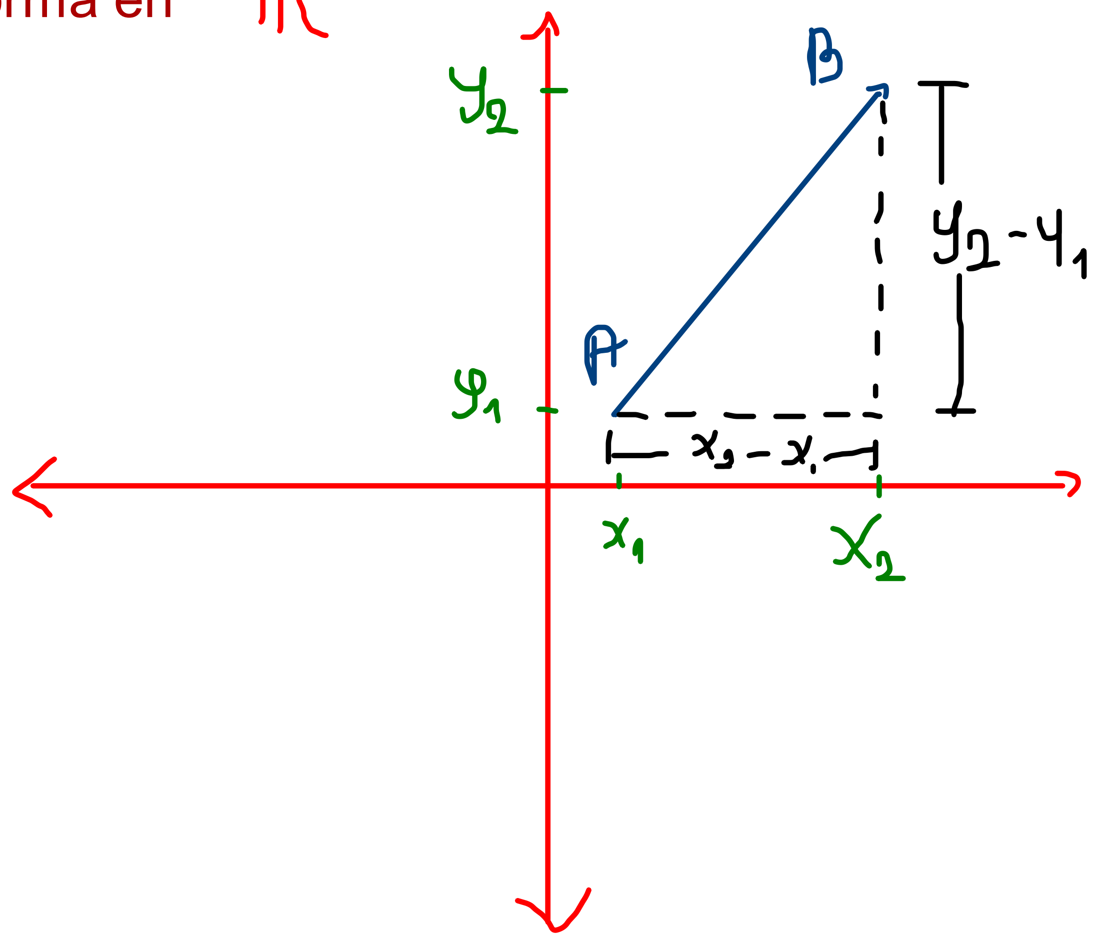


$$\|\vec{AB}\| = |B-A| = |A-B|$$

$$= |-5-8| = |8-(-5)|$$

$$= |-13| = |13| = 13$$

Norma en $\mathbb{R}^2$



$$\|\vec{AB}\|^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

$$\|\vec{AB}\| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

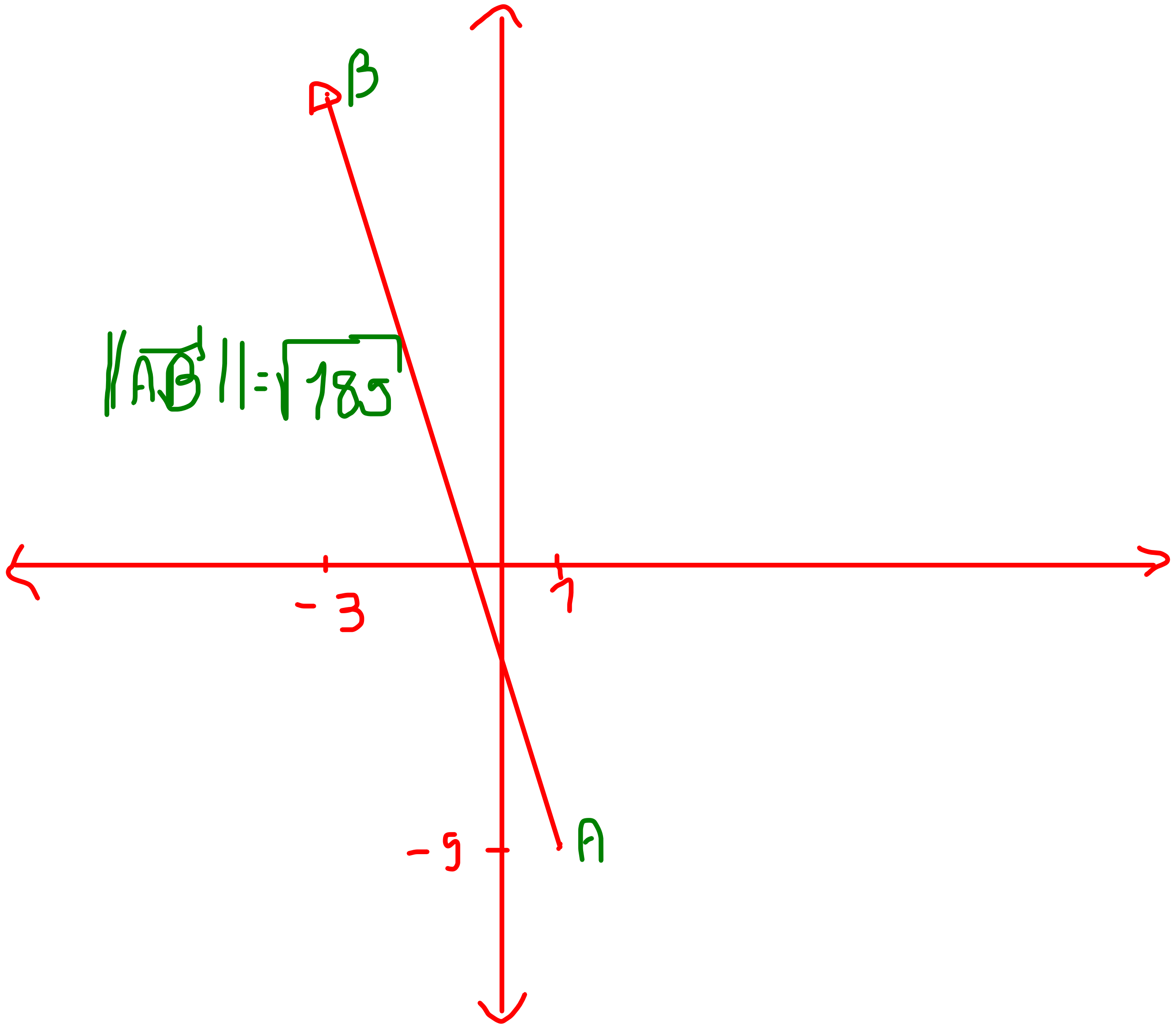
Ejemplo: Calcula la norma del vector que tiene las siguientes componentes

$A(\underset{x_1}{1}, \underset{y_1}{-5})$; $B(\underset{x_2}{-3}, \underset{y_2}{8})$

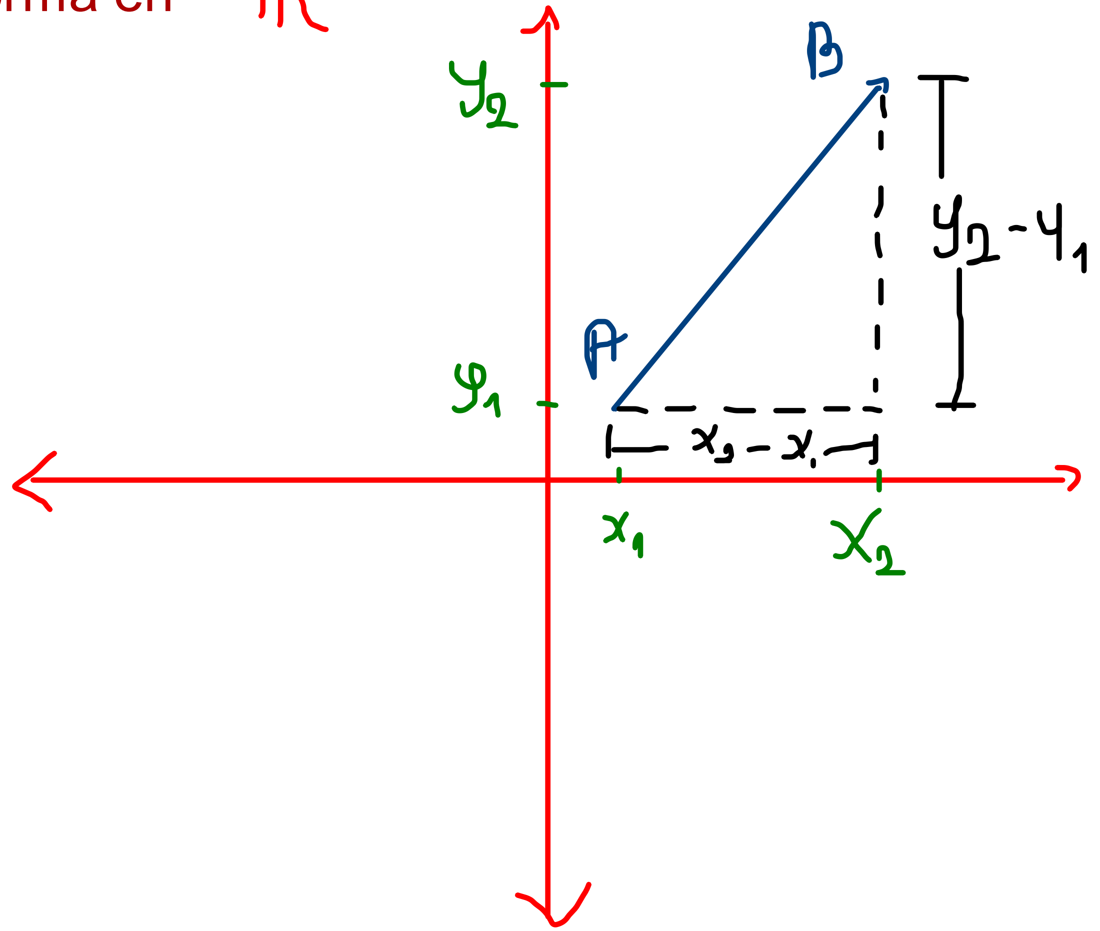
$$\|\vec{AB}\| = \sqrt{(-3-1)^2 + (8-(-5))^2}$$

$$= \sqrt{(-4)^2 + (13)^2} = \sqrt{16 + 169}$$

$$= \sqrt{185} \approx 13,60$$



Norma en $\mathbb{R}^2$



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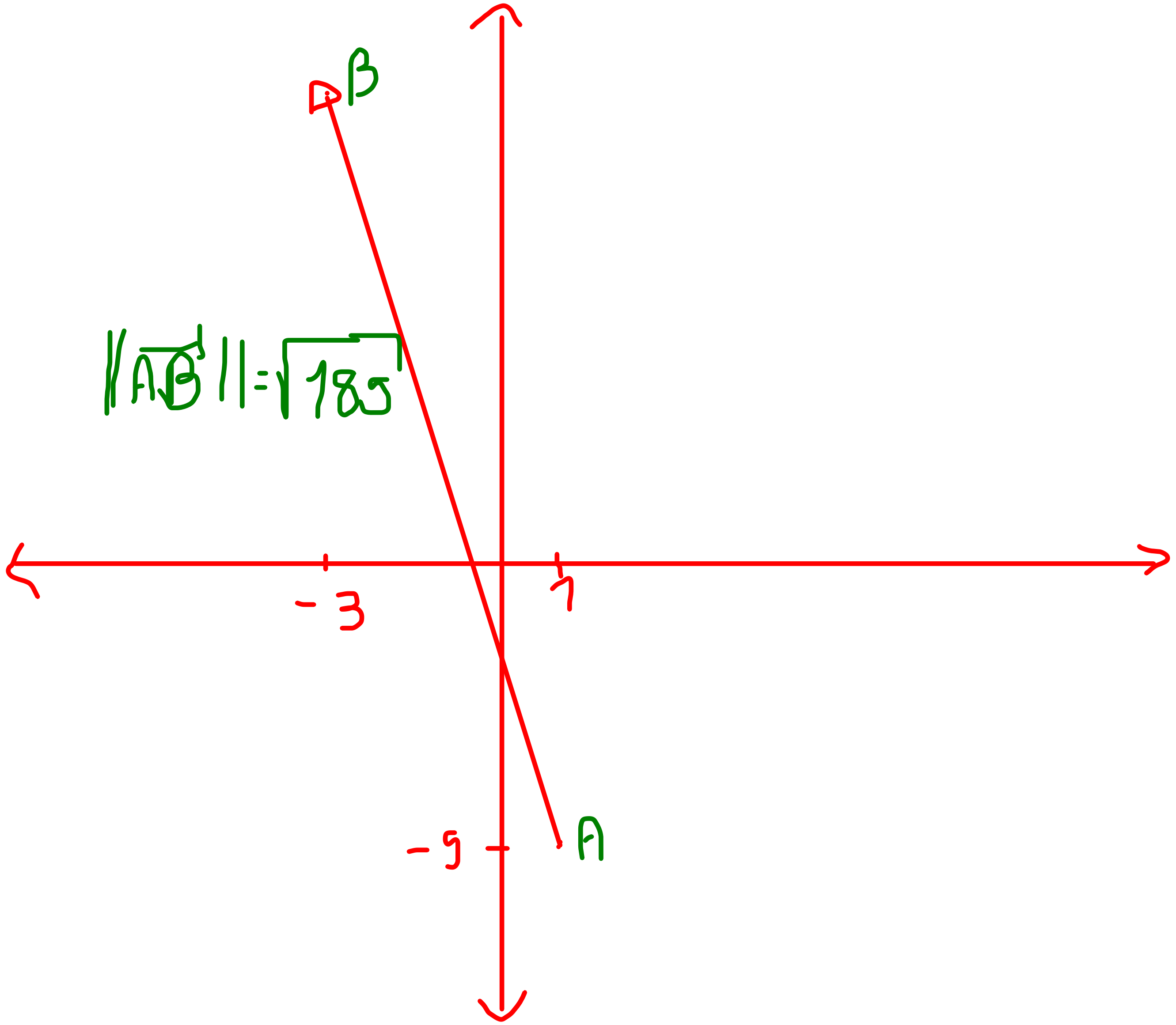
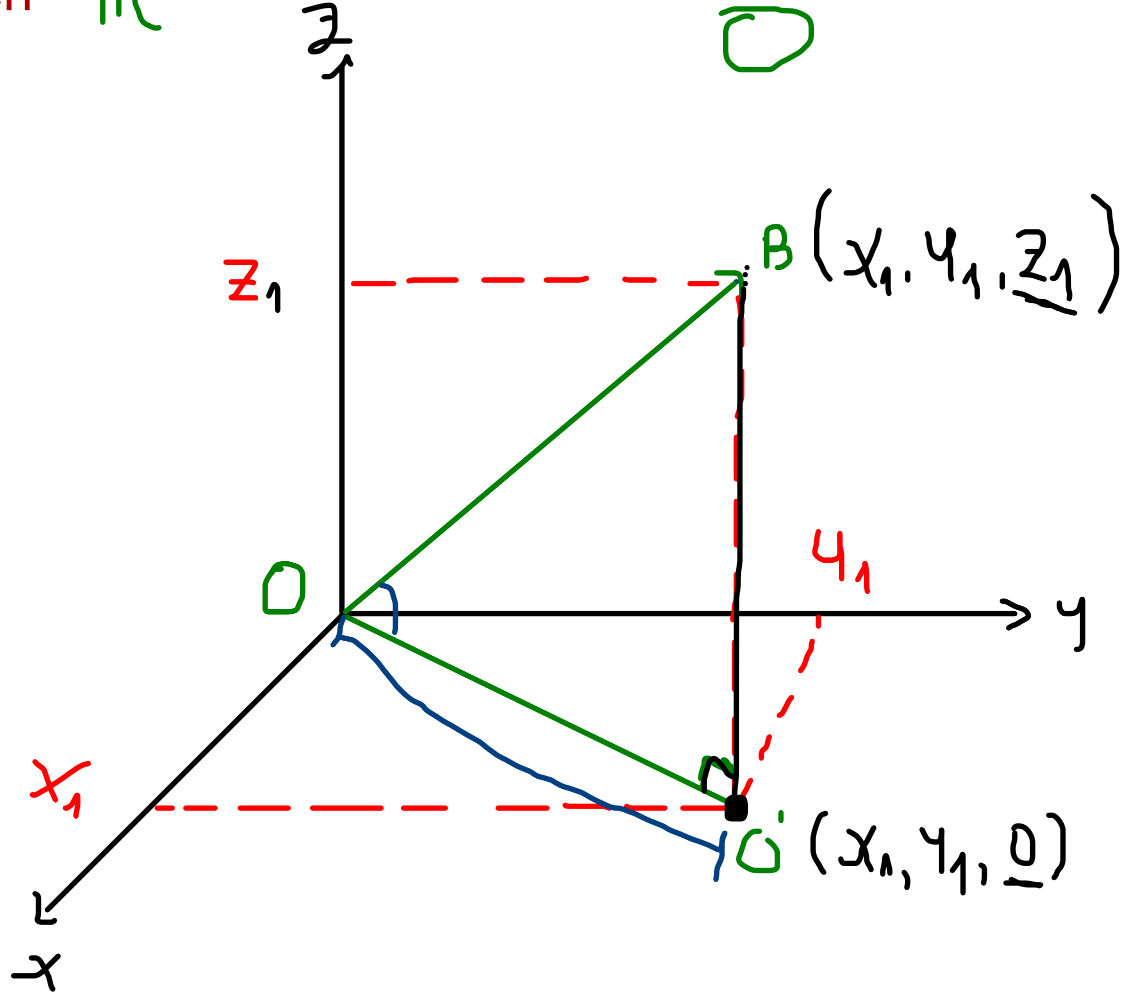


Norma en $\mathbb{R}^3$

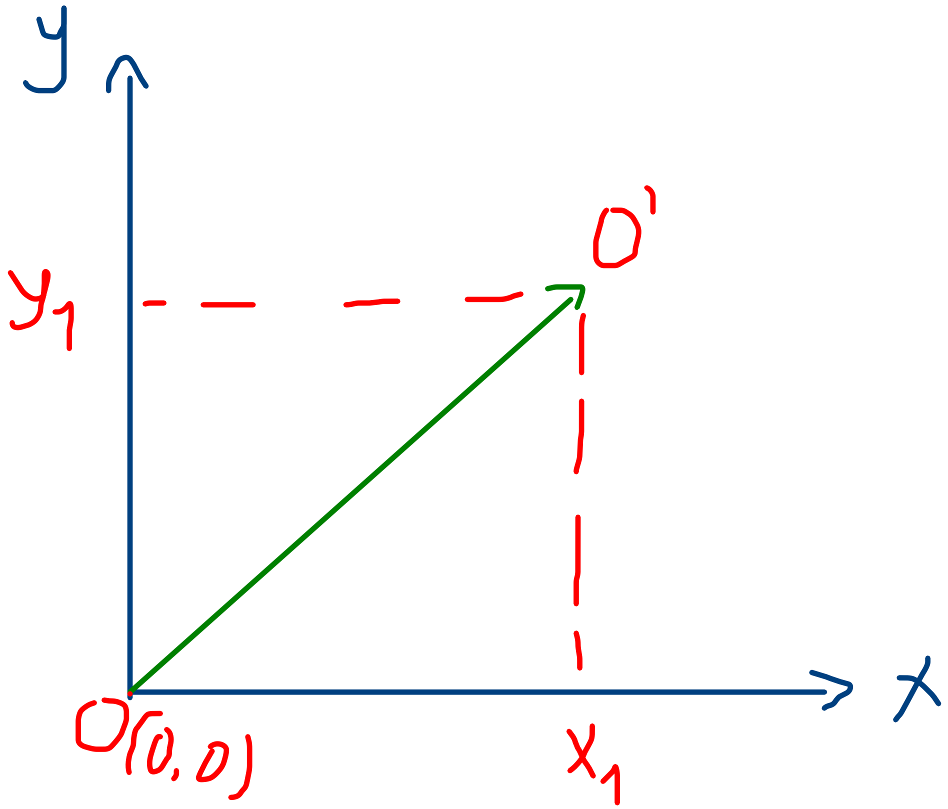


$$\|\vec{OB}\|^2 = \overline{BO'}^2 + \overline{OO'}^2$$

$$\|\vec{OB}\|^2 = |z_1 - 0|^2 + \left(\sqrt{x_1^2 + y_1^2}\right)^2$$

$$= z_1^2 + x_1^2 + y_1^2$$

$$\boxed{\|\vec{OB}\| = \sqrt{x_1^2 + y_1^2 + z_1^2}}$$



$$\overline{OO'} = \sqrt{x_1^2 + y_1^2}$$

Norma en $\mathbb{R}^n$

Dado un vector $\vec{U}$ n-dimensional, este tiene como norma

$$\vec{u} = (u_1, u_2, \dots, u_n)$$

$$\|\vec{u}\| = \sqrt{u_1^2 + u_2^2 + \cdots + u_n^2}$$