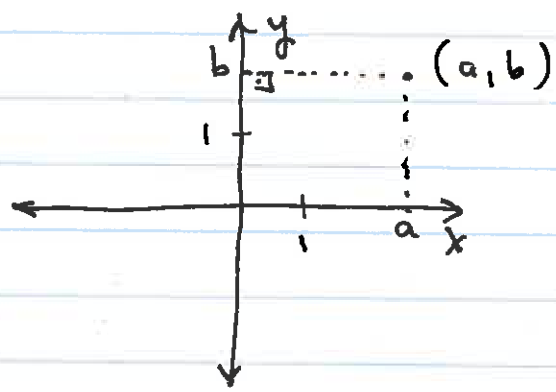
1.1 Continue.

$$\mathbb{R}^2 = \{(x,y) \mid x,y \in \mathbb{R}\}$$

$\updownarrow$ 1-1 correspondence between $\mathbb{R}^2$ and the points of the plane.

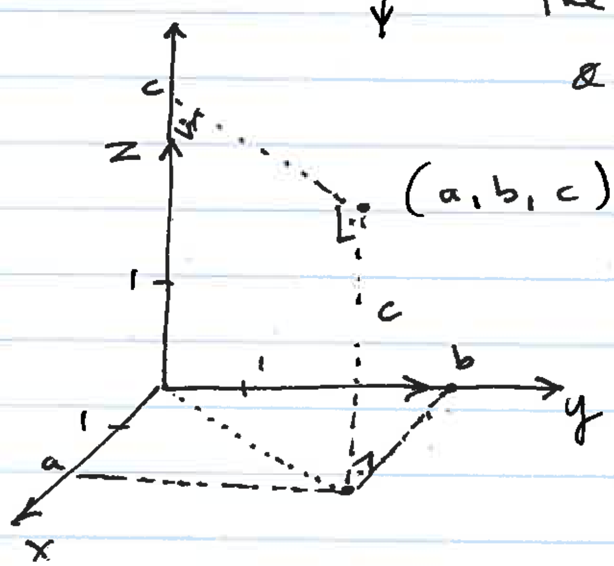
once choices of axes unit lengths & directions are made

Plane:

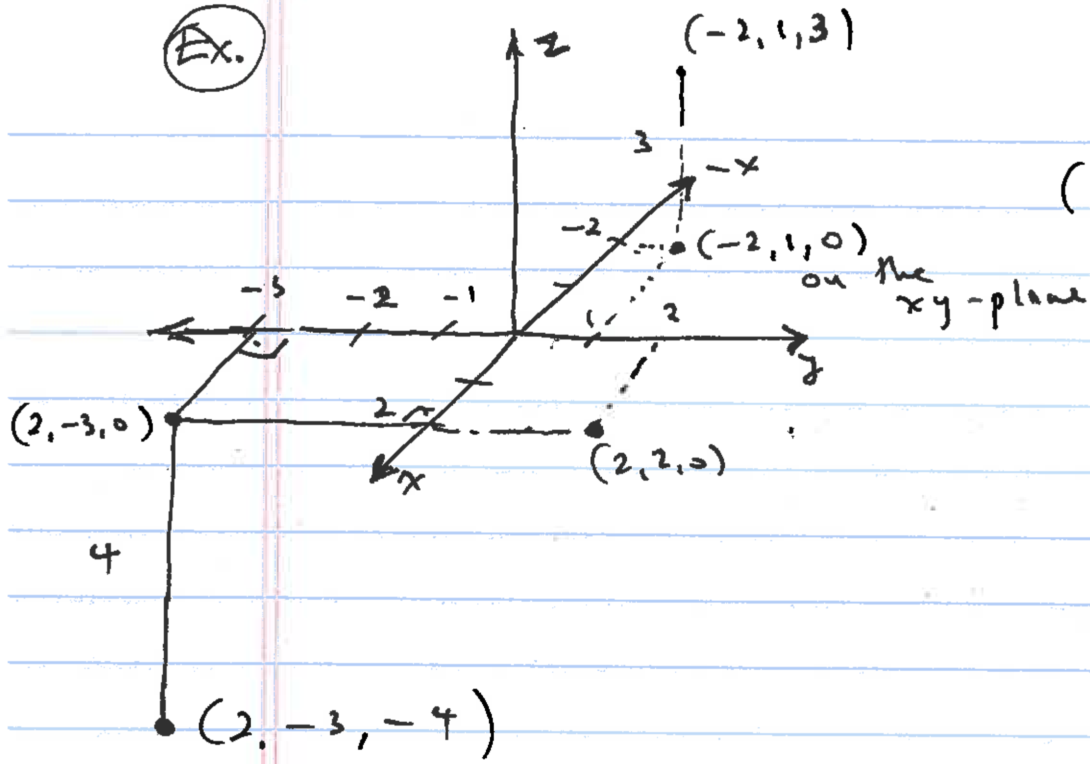


$$\mathbb{R}^3 = \{(x,y,z) \mid x,y,z \in \mathbb{R}\}.$$

$\updownarrow$ 1-1 correspondence between the point of the space & $\mathbb{R}^3$ (once proper choices of axes, unit length + directions are made.)



Ex.

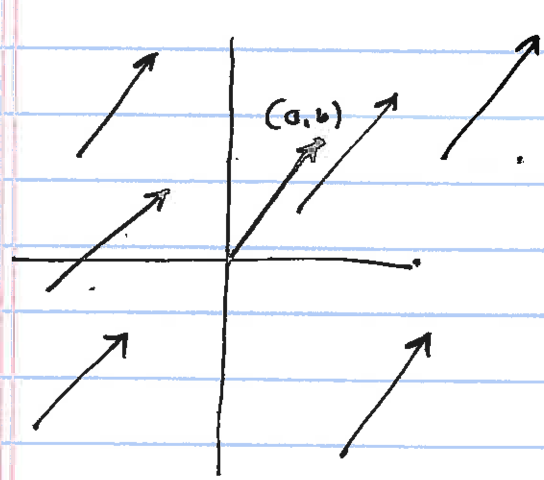


(−2, 1, 3)

We Have: points of 3 − space $\underset{1-1}{\longleftrightarrow}$ $\mathbb{R}^3$

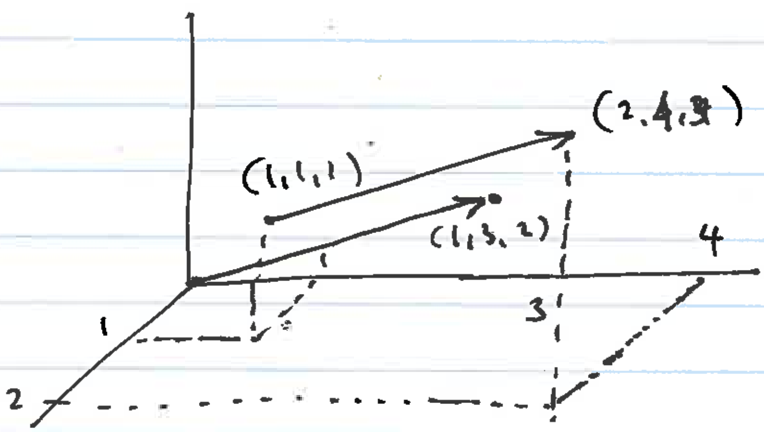
<u>Vector</u> : Magnitude <u>and</u> Direction

Assume all vectors with same magnitude and same direction are equal



All equal, but we choose the one starting at $\vec{0}$ to be the representation, ending at (a, b) all these vectors will be represented by (a, b).

Ex.



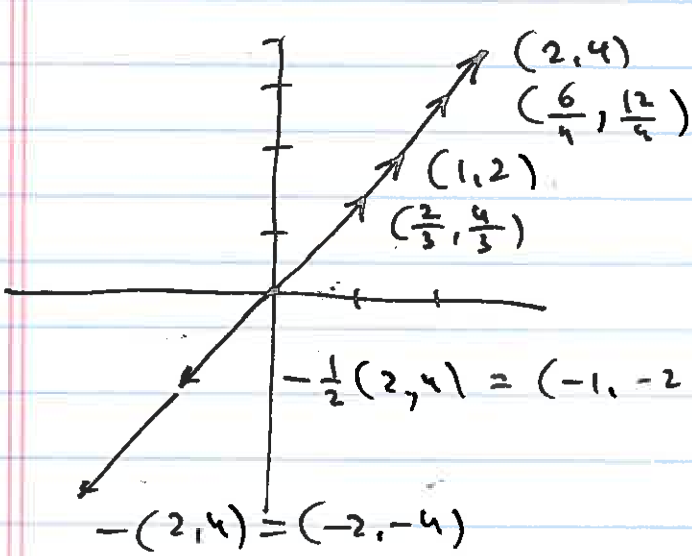
Both vectors will be denoted by (1,3,2).

Points $\longleftrightarrow$ $\mathbb{R}^n$ $n=2,3,\ldots$

?? <- - - - algebra

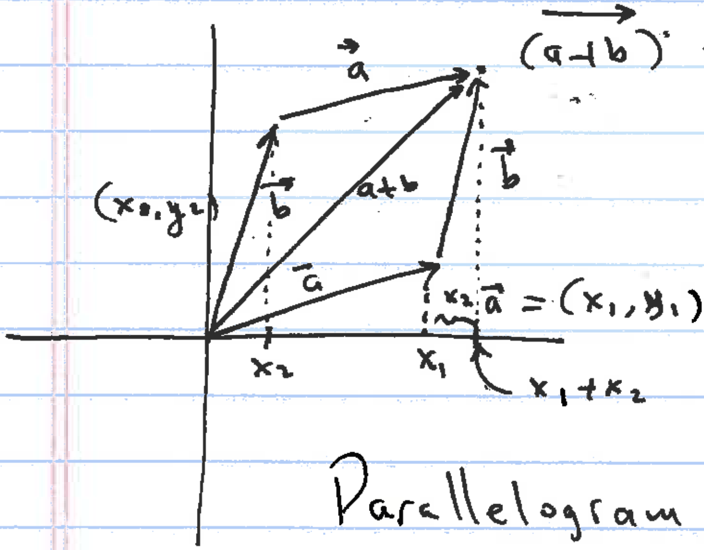
① $\vec{a}$ vector, $\vec{a} \neq 0$

$\{ k \cdot \vec{a} \mid k \in \mathbb{R} \}$ all real multiples of $\vec{a}$



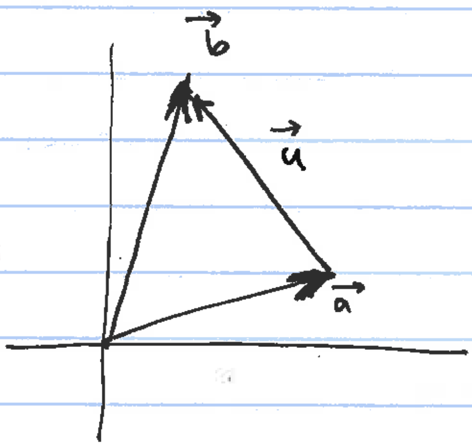
Line through the origin and $\vec{a}$.
(Tips of the vectors.)

② $\vec{a}, \vec{b} \in \mathbb{R}^n$ $\qquad \vec{a}+\vec{b}$?



$$\overrightarrow{(a+b)} = (x_1+x_2,\ y_1+y_2)$$
$$= (x_2+x_1,\ y_2+y_1)$$
$$= (\overrightarrow{b+a})$$

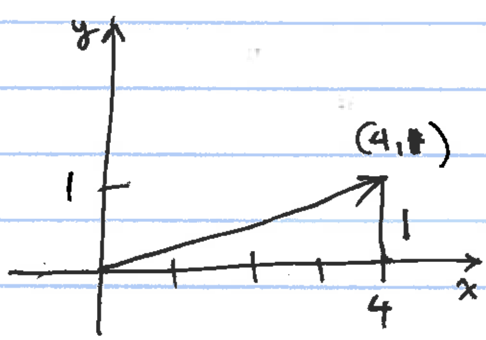
Parallelogram Law / Head-tail method



$$\vec{a} + \vec{u} = \vec{b}$$

$$u = \vec{b} - \vec{a}$$

Exc #10 p7. Length of (4,1)



$$\sqrt{4^2+1^2} = \sqrt{17}.$$

$$\underbrace{|(x_1, \dots x_n)| = \sqrt{x_1^2 + x_2^2 + \dots + x_n^2}}_{\text{in general in } \mathbb{R}^n.}$$

$$\sqrt{\left(\sqrt{a^2+b^2}\right)^2+c^2} = \sqrt{a^2+b^2+c^2}$$ 5