251X02 Tues Jan 12th

January 12, 2021 3:23 PM

Matrix Algebra
Linear Algebra
Algebra and Geometry

Geometry
lines
planes
distance
angle

Algebra
especially >3 dimensions

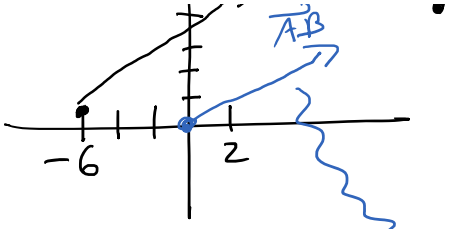
Ex: Tracking an object's 3D position and time
4 variables
4D problem

Vector: line segment with direction

Ex: $A = (-6, 1)$ $B = (2, 5)$

Graph $\vec{AB}$

$\vec{AB} = [8, 4]$ Think B-A



$\overrightarrow{AB}$ is in standard position

Notation:

$[1,2]$: vector

$(1,2)$: point

c : scalar/constant/real number

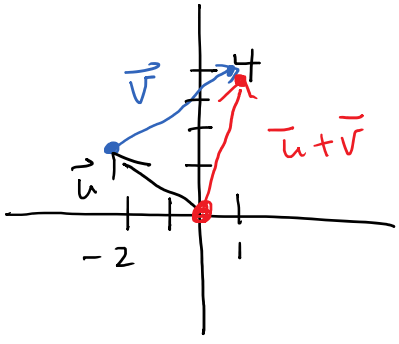
$\vec{c}$: vector

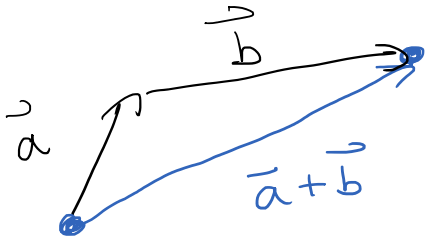
c : textbook version of vectors

Ex: Algebra/geometry of $\vec{u}+\vec{v}$

$\vec{u}=[-2,1]$ $\quad \vec{v}=[3,3]$

$\vec{u}+\vec{v}=[1,4]$



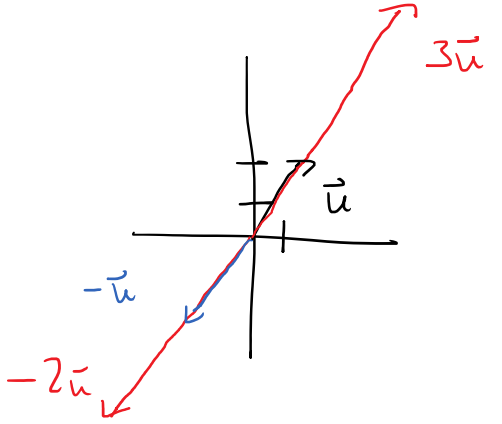


Ex: Scalar multiplication $c\vec{u}$

$\vec{u} = [1, 2]$

$3\vec{u} = [3, 6]$

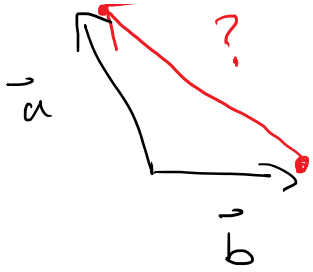
$-2\vec{u} = [-2, -4]$



$\vec{u}, 3\vec{u}, -2\vec{u}$ are all parallel

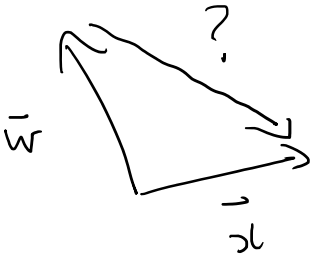
Ex: Geometry/algebra of $\vec{u} - \vec{v}$

$[8,5] - [4,4] = [4,1]$



$? = -\vec{b} + \vec{a}$

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

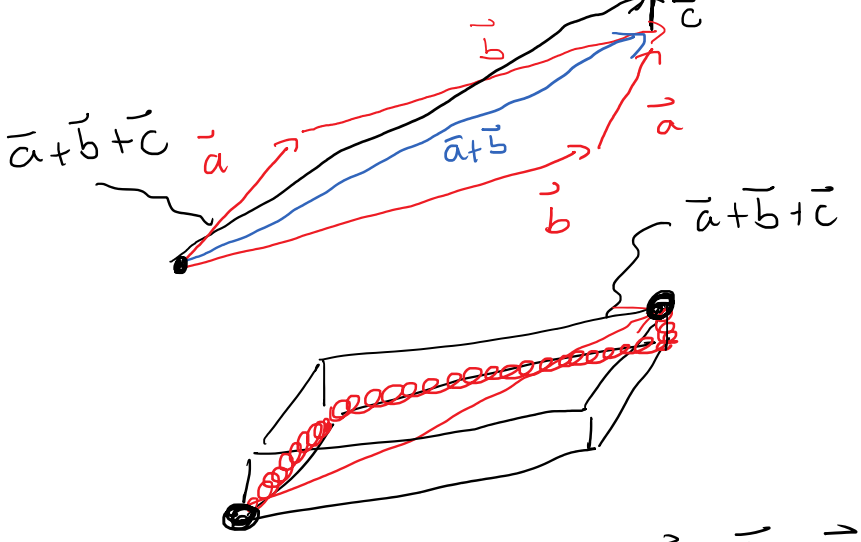


$? = -\vec{w} + \vec{x}$

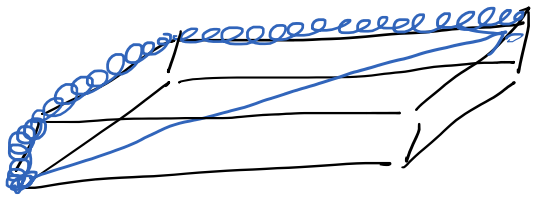
$= \vec{x} - \vec{w}$

Ex:

Draw $\vec{a}+\vec{b}+\vec{c}$



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



Order doesn't matter when adding vectors

$$\bar{u} + \bar{v} = \bar{v} + \bar{u}$$