Week 1 Tuesday

September 3, 2019 9:38 AM

Math Lab TEC 142

www.leahhoward.com
Lecture Notes and Videos

Course pack: Suggested HW Problems and Answers

D2L or www.leahhoward.com/251CP.pdf

Can print at Satellite Printshop (CBA Atrium)

Course Overview: Geometry and Algebra

Geometry: Distances and angles in 2D and 3D

Algebra: Develop general formulas
Handle higher dimensions

e.g. tracking an object's spatial location and temperature is a 4D problem

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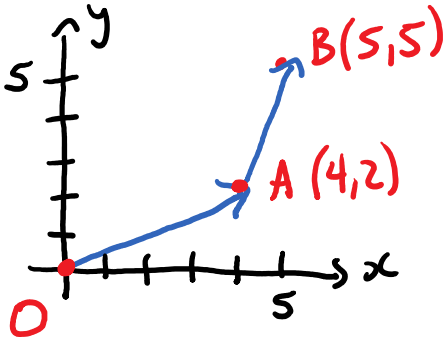
1.1 Geometry and Algebra of Vectors

Vector: Directed line segment
Used for velocity, forces etc.

Ex:



Vectors $\overrightarrow{OA} = [4,2]$

$\overrightarrow{AB} = [1,3]$ Think B-A

"Components" of the vector

Could write $\overrightarrow{OA} = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$

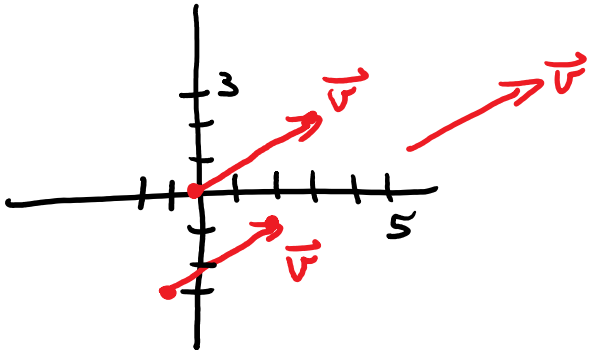
$\overrightarrow{AB} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$

Ex: Points $C = (-1,-3)$ $D = (2,-1)$

Find $\vec{v} = \overrightarrow{CD}$ and draw it.

$\vec{v} = [2-(-1), -1-(-3)]$ Think D-C

$= [3, 2]$



A given vector can be drawn from any initial position.

Rephrased: same direction, same length $\Rightarrow$ same vector

A vector is in <u>standard position</u> if it starts at the origin.

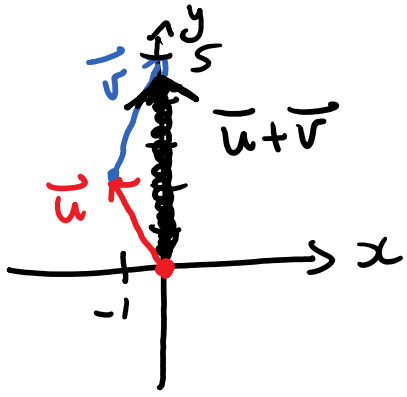
<u>Notation</u>: square brackets for vectors
round " " points

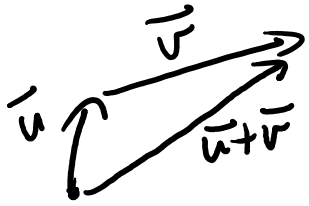
<u>Ex</u>: Vector addition

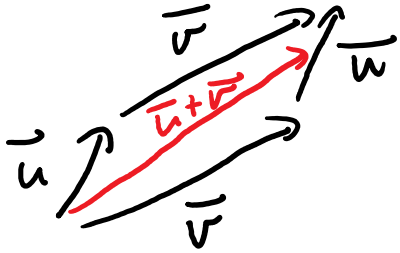
$\vec{u} = [-1, 2]$ $\vec{v} = [1, 3]$

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

$= [0, 5]$





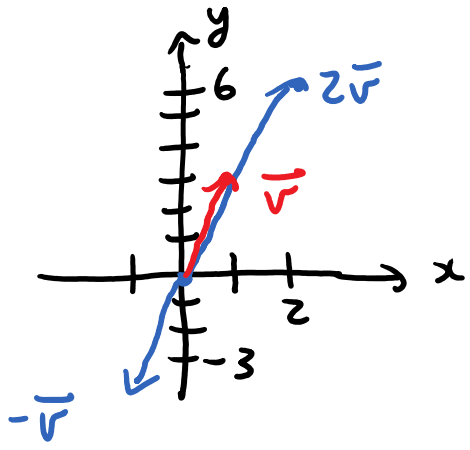


<u>Ex</u>: Scalar Multiplication

$\vec{v} = [1, 3]$

$2\vec{v} = [2, 6]$ twice as long as $\vec{v}$

$-\vec{v} = [-1, -3]$ opposite direction of $\vec{v}$

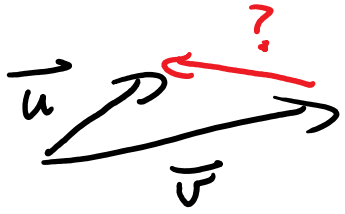


$\vec{v}$, $7\vec{v}$, $-2\vec{v}$ are all <u>parallel</u>

<u>Ex</u>: $[2, 6] - [3, 4] = [2, 6] + [-3, -4]$

$= [-1, 2]$

<u>Ex</u>:



? = Backwards along $\vec{v}$, forwards along $\vec{u}$

$= -\vec{v} + \vec{u}$

$= \vec{u} - \vec{v}$