

Section 1.1: The Geometry and

Tuesday, September 4, 2018

4:35 PM

Algebra of Vectors

vectors in the plane:

vector is a directed line segment that corresponds to a displacement from one point A to another point B

→ think about how this definition relates to the usual one:
a quantity with magnitude and direction

in general, A and B have coordinates

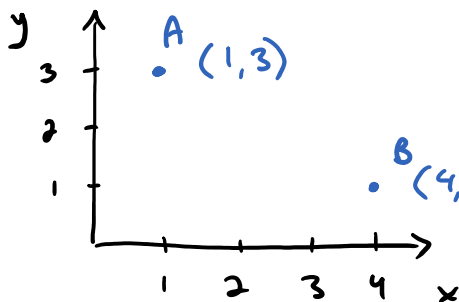
(x_1, y_1) and (x_2, y_2) for 2D vectors

↑
round brackets

then vector \vec{AB} can be written as

$$[x_2 - x_1, y_2 - y_1]$$

↑
square brackets



so $\vec{AB} = [3, -2]$

↑

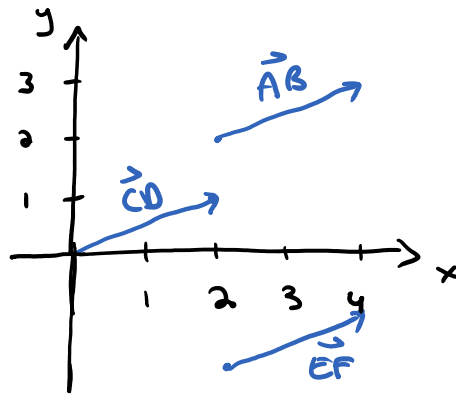
this is written as a row vector

you can also write \vec{AB} as a
column vector

$$\begin{bmatrix} 3 \\ -2 \end{bmatrix}$$

(more on this later)

Equality of vectors



these three vectors are
equal

vector \vec{CD} is said to
be in standard position
since its tail is at the
origin

notation:

in 2D:

$$\vec{0} = [0, 0]$$

the zero vector

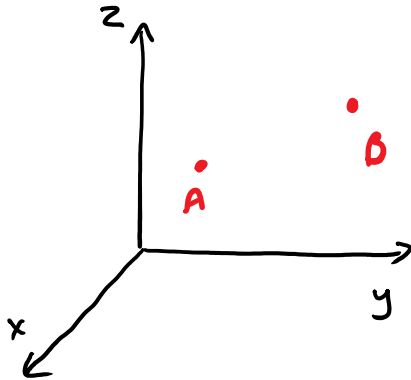
← hard to draw!
but it is a
perfectly good
vector

the set of all vectors with two components
is written \mathbb{R}^2 (pronounced R two)

\mathbb{R}^3 - three components

note: vectors in higher dimensions are much more difficult to draw!

vectors in space: (3D)



$$A = (x_1, y_1, z_1)$$

$$B = (x_2, y_2, z_2)$$

$$\vec{AB} = [x_2 - x_1, y_2 - y_1, z_2 - z_1]$$