

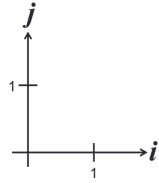
# Unit Vectors Notes

## What is a UNIT VECTOR?

• A unit vector is a vector that is 1 unit long!

•  $\vec{i}$  is a unit vector ...  $\vec{i} = \langle 1, 0 \rangle$ .

•  $\vec{j}$  is a unit vector ...  $\vec{j} = \langle 0, 1 \rangle$ .



## a Vector in two forms ...

A vector in component form ...

... can also be written as ...

... the sum of unit vectors

## Example 1 ... initial point: (-1, 5) terminal point: (-2, -3)

- Find component form.
- Write as a sum of unit vectors.
- Find the magnitude.
- Find the direction. Use  $[0^\circ, 360^\circ)$ .

## Example 2 ... Vector Operations

• Given  $\vec{v} = 3\vec{i} - \vec{j}$  and  $\vec{w} = -2\vec{i} + 3\vec{j}$ .

• Find:

• a)  $4\vec{v} + 2\vec{w}$

• b)  $\vec{v} - 3\vec{w}$

• c)  $\frac{1}{2}\vec{v} + \frac{1}{2}\vec{w}$

## a unit vector in the direction of $\vec{v}$ ...

A unit vector,  $\vec{u}$ , in the direction of  $\vec{v}$  ...

... is given by:  $\vec{u} = \frac{\vec{v}}{\|\vec{v}\|}$

## Example 3 ... Find a unit vector in the direction of each given vector.

a)  $\vec{v} = \langle 3, -4 \rangle$

b)  $-6\vec{i} + 4\vec{j}$