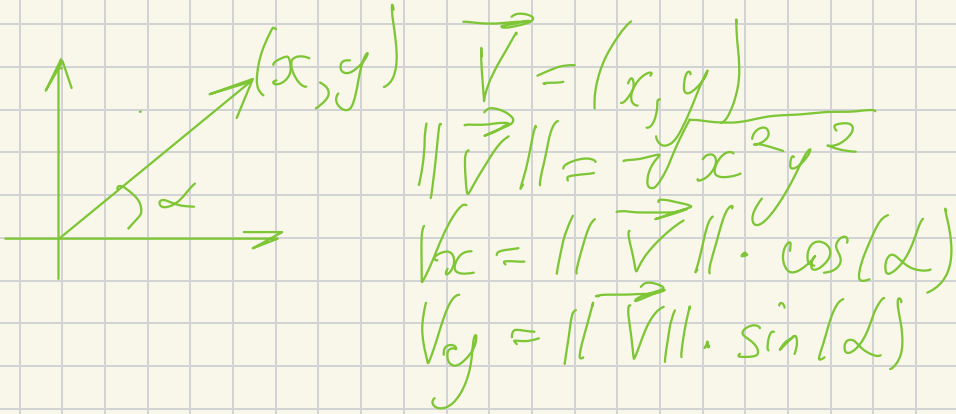
Vectors

a. Definitions
   i. 2-D/3-D/4-D/.../N-D
   ii. Matrix form
b. Adding/scabstracting/scaling
c. Magnitude and direction
d. Dot/Cross product

a. Definitions

i. 2-D/3-D/4-D/.../N-D
ii. Matrix form



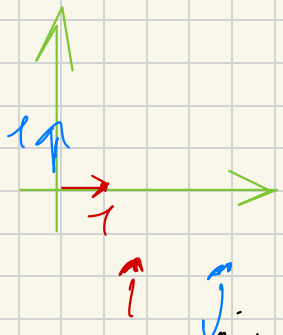
$\vec{V} = (x, y)$

$\|\vec{V}\| = \sqrt{x^2 + y^2}$

$V_x = \|\vec{V}\| \cdot \cos(\alpha)$

$V_y = \|\vec{V}\| \cdot \sin(\alpha)$

i. 2-D/3-D/4-D/.../N-D



$\vec{V} = (5, 3)$

$\vec{V} = 5\hat{i} + 3\hat{j}$

b. Adding/scabstracting/scaling

$\vec{u} = 5\hat{i}$

$2\vec{u} = 10\hat{i}$

$\frac{1}{5}\vec{u} = \hat{i}$

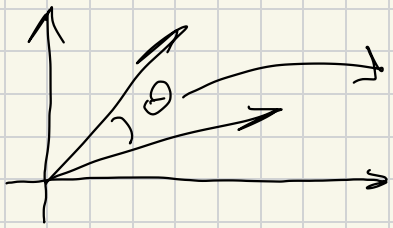
$\vec{u} = 2\hat{i} - 4\hat{j}$

$\vec{u} + \vec{v} = (2\hat{i} + 5\hat{i}) + (3\hat{j} - 4\hat{j})$

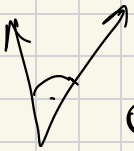
$= 7\hat{i} - 1\hat{j}$

c. Magnitude and direction

$\vec{u} \cdot \vec{v} = \|\vec{u}\| \cdot \|\vec{v}\| \cdot \cos\theta = 5 \cdot 2 + 3 \cdot (-4) = 10 - 12 = -2$



This angle teta



orthogonal

(x_1, y_1) (x_2, y_2)

$\vec{u} \times \vec{u} = \|\vec{u}\| \cdot \|\vec{v}\| \cdot \sin\theta = x_1 y_2 - x_2 y_1$

crossproduct