Math 511

Google Voice Number (913) 815-0314

Exam 1

Probs

① $\boxed{\text{Do Not}}$ accept not knowing.

② to many blank prob #1

③ to many blank det(f) = ?

ex

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = \begin{vmatrix} 1 & a & a^2 \\ 0 & b-a & b^2-a^2 \\ 0 & c-a & c^2-a^2 \end{vmatrix} = \begin{vmatrix} b-a & b^2-a^2 \\ c-a & c^2-a^2 \end{vmatrix}$$

④ $\boxed{\text{Ops}}$ on matrices!

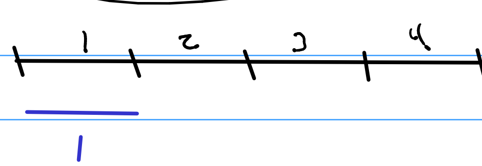
$$\underset{3\times 1}{\begin{bmatrix} a \\ b \\ c \end{bmatrix}} \underset{1\times 3}{\begin{bmatrix} 1 & 2 & 3 \end{bmatrix}} = \underset{3\times 3}{\begin{bmatrix} & & \\ & & \\ & & \end{bmatrix}}$$

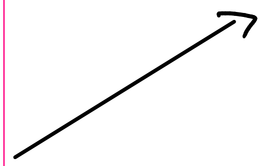
$\boxed{\text{Ch3}}$ Vector Spaces

→ purpose of numbers?

$\boxed{4}$ ← Scalar

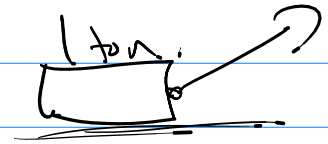
true object(s)



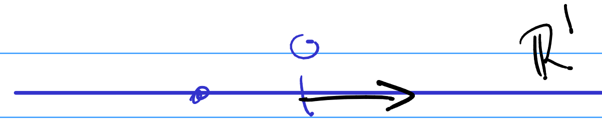


Vector 2 part object.

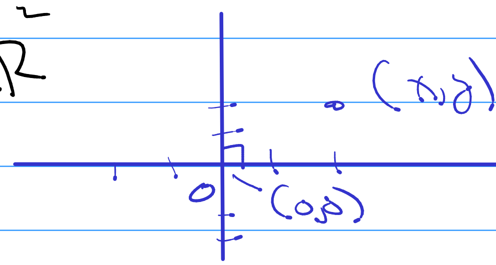
= Magnitude and direction

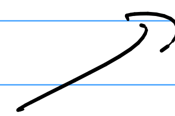


Space **1D**

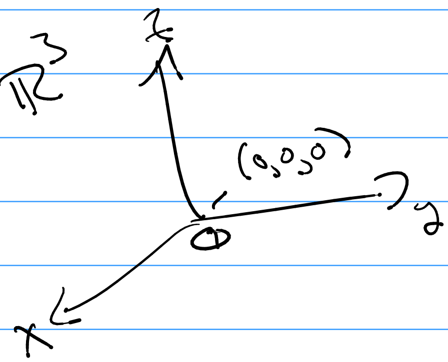


2D : $\mathbb{R}^2$





3D : $\mathbb{R}^3$



nD : $\mathbb{R}^n$

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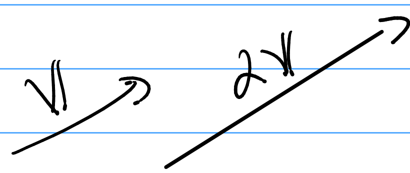
object **Vectors**: **ops** αV , $V + U$

$\alpha V'$ is



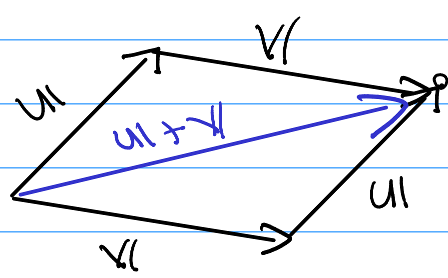
Mag is $|V|$

then $|\alpha V| = |\alpha||V|$

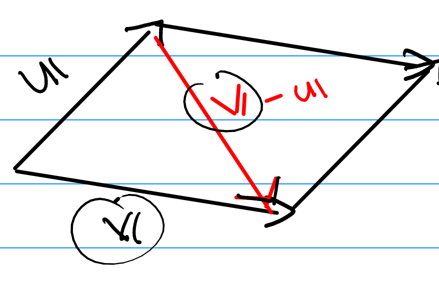
if $\alpha \geq 0$ same dirc.

$\alpha < 0$ opp. direc

$U + V$



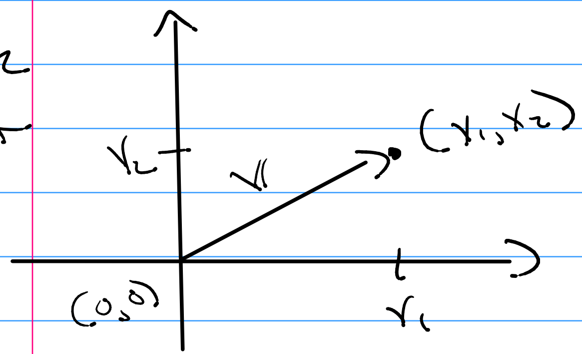
Parallelogram prop.



Numbers on Vectors?

(use the fact that location doesn't matter on vectors)

$\mathbb{R}^2$



$$v = \begin{bmatrix} v_1 \\ v_2 \end{bmatrix}$$

in $\mathbb{R}^n$ $\quad v = \begin{bmatrix} v_1 \\ v_2 \\ \vdots \\ v_n \end{bmatrix} = [v_1 \; v_2 \cdots v_n]^T$

$$\alpha v = \begin{bmatrix} \alpha v_1 \\ \alpha v_2 \\ \vdots \\ \alpha v_n \end{bmatrix}$$

$$|v| = \sqrt{v_1^2 + v_2^2 + \cdots v_n^2}$$

$$|v|^2 = v_1^2 + v_2^2 + \cdots + v_n^2$$

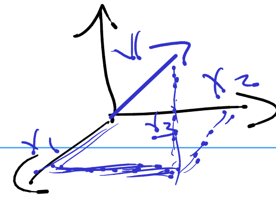
$$|\alpha v| = \left((\alpha v_1)^2 + (\alpha v_2)^2 + \cdots + (\alpha v_n)^2\right)^{1/2}$$

$$= \sqrt{\alpha^2}\left(v_1^2 + v_2^2 + \cdots + v_n^2\right)^{1/2}$$

$$= |\alpha| \, |v|$$

$$v + u = \begin{bmatrix} v_1 + u_1 \\ v_2 + u_2 \\ \vdots \\ v_n + u_n \end{bmatrix}$$

Vector Space



objects: "vectors"

ops: αv, $v + u$

$v, u, w \in V$ ← are in; V ← vector space

α, β are scalars

Axioms

closure axioms of a vector space

(C1) $\alpha v \in V$

(C2) $v + u \in V$

additive axioms

(A1) $u + v = v + u$

(A2) $(u + v) + w = u + (v + w)$

(A3) there is a $0 \in V$ so that $v + 0 = v$

(A4) there is a $-v$ so that $v + (-v) = 0$

scalar mult. axioms

(A5) $\alpha(u + v) = \alpha u + \alpha v$

(A6) $(\alpha + \beta)u = \alpha u + \beta u$

(A7) $(\alpha \beta) u = \alpha(\beta u)$

(A8) $1 \cdot u = u$