Note Title 5/21/2020

$$\boxed{\forall v \neq 0 \qquad |u| \geq |u_v| \qquad \forall u \in X}$$

$$\underline{|u|^2} = |\underbrace{\overset{\text{resto}}{u - u_v}}_{\substack{\perp v \\ \text{per il Th. proiezione}}} + \underbrace{u_v}_{\substack{// v \\ \text{per la definizione di proiezione}}}|^2 =$$

$$= |u - u_v|^2 + |u_v|^2 \geq \underline{|u_v|^2}$$

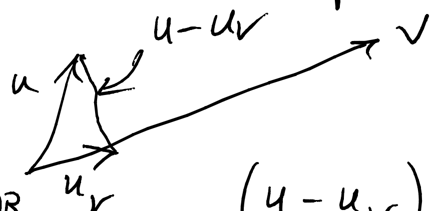
$$|u-u_v|^2 \geq 0$$

$a \perp b \quad (ab = 0)$

$$|a+b|^2 = |a|^2 + |b|^2$$

$$aa + \underset{0}{ab} + \underset{0}{ba} + bb$$

Th. della proiez.



$(u - u_v)v = 0$ ortogonali

$$u_v = \frac{uv}{|v|^2} v \quad \text{paralleli}, \qquad \frac{uv}{|v|^2} \in \mathbb{R}$$

Da $|u|^2 \geq |u_v|^2$ prend. le radici segue

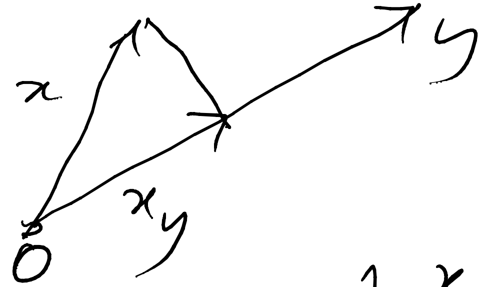
AL_2.1 Lo spazio euclideo $\mathbb{R}^n$

$$x_y = \frac{xy}{|y|^2}\, y =$$

$$x = (x_1 \dots x_n)$$
$$y = (y_1 \dots y_n) \neq (0, \dots, 0)$$

$$= \frac{\sum_1^n x_i y_i}{\sum_1^n y_i^2} \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix}$$

$$xy = \sum_1^n x_i y_i$$
$$|y|^2 = \sum_1^n y_i^2$$



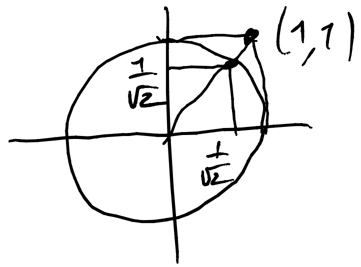
$$\frac{x}{|x|} = \begin{cases} -1 & x > 0 \\ 1 & x < 0 \end{cases}$$

niente
$x = 0$

$$\frac{(1,1)}{|(1,1)|} = \frac{1}{\sqrt{2}}(1,1) = \quad x \quad x \in \mathbb{R}^n$$

$$\frac{x}{|x|} \quad \text{versore di } x$$

$$= \left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$$



$$\boxed{\text{AL\_2.1}}$$

Spazio euclideo reale

$$\boxed{\begin{aligned} |a|^2 &= aa \\ |a| &= \sqrt{aa} \end{aligned}}$$

$$|x+y|^2 \overset{a = x+y}{=} (x+y)(x+y) \underset{\text{bilinearità}}{=} xx + xy + yx + yy = |x|^2 + |y|^2 + 2xy$$

$= 0$ se x e y sono ortogonali

$$\left.\begin{aligned} a(b+c) &= ab + ac \\ a(\lambda b) &= \lambda ab \end{aligned}\right\} \text{Bilin.}$$

$ab = ba$ simmetria

$$\left\{\begin{aligned} &aa \geq 0 \\ &aa = 0 \iff a = 0 \end{aligned}\right.$$

aa def. > 0

$$\underbrace{(x+y)}_{a}\,(\underset{b}{x}+\underset{c}{y}) = (x+y)x + (x+y)y =$$

$$\overset{\text{simm.}}{=} x($$

$$|x-\lambda y|^2 = \underbrace{(x-\lambda y)}_{a}\underbrace{(x-\lambda y)}_{a} = \qquad aa = |a|^2$$

$$= xx - x(\lambda y) - (\lambda y)x + (-\lambda y)(-\lambda y) =$$

$$= |x|^2 + \lambda^2|y|^2 - 2\lambda xy \geq 0$$

$$\boxed{\frac{\Delta}{4} \leq 0} \qquad \boxed{(xy)^2 - |x|^2|y|^2 \leq 0}$$

Schmerz

$| \ | : X \to \mathbb{R}$

$\big|\, \underset{\substack{\uparrow\\ \text{norma}}}{\|x\|}\,\big|$ $\in X$ ← modulo in $\mathbb{R}$ oppure in $\mathbb{C}$

$\|x\| = |x| =$ norma di x

$|x| \geq 0 \qquad \big|\underbrace{\|x\|}_{\geq 0}\big| = \|x\|$

$$|\overbrace{\lambda x}^{\in X}| = |\lambda|\,|\overset{\in X}{x}|$$

norma — modulo $\in \mathbb{R}$ o $\mathbb{C}$ — norma

$u \approx \overrightarrow{AB}$

$|\lambda x| = |\lambda|\,|x|$

$|xy| \leq |x|\,|y|$ Schwarz

prodotto scalare