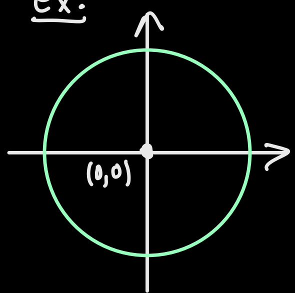
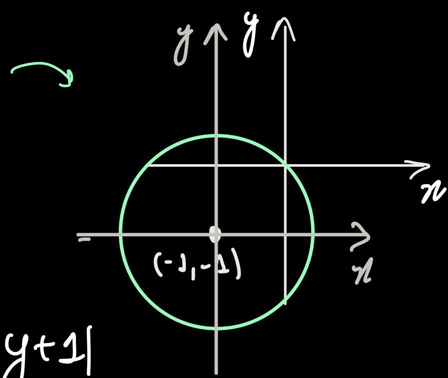
Translação de Eixos

$$t(x,y) = (x+h,\ y+K)$$

ex:





$$t(x,y) = (x+1,\ y+1)$$

Rotação de Eixos

$$t(x,y) = \begin{bmatrix} \cos\theta & \operatorname{sen}\theta \\ -\operatorname{sen}\theta & \cos\theta \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = (u,v)$$

$$\begin{cases} u = x\cos\theta + y\operatorname{sen}\theta \\ v = -x\operatorname{sen}\theta + y\cos\theta \end{cases}$$

processo inverso

$$t^{-1}(u,v) = \begin{bmatrix} \cos\theta & -\operatorname{sen}\theta \\ \operatorname{sen}\theta & \cos\theta \end{bmatrix} \begin{bmatrix} u \\ v \end{bmatrix} = (x,y)$$

$$\begin{cases} x = u\cos\theta - v\operatorname{sen}\theta \\ y = u\operatorname{sen}\theta + v\cos\theta \end{cases}$$

Nota: sendo x, y as coordenadas antigas e u, v as novas.

$\boxed{\text{Reta q passa por } (0,1,2) \text{ e tem a direção do vetor } (-1,3,0):}$

$$\{(0,1,2) + t(-1,3,0) : t \in \mathbb{R}\}$$

representação paramétrica

$\boxed{\text{Segmento de reta unindo } (0,1,2) \text{ a } (-1,4,2)}$

$$\{(0,1,2) + t(-1,3,0) : t \in [0,1]\}$$

$\boxed{\text{Subespaço vetorial de } \mathbb{R}^n}$

$1 \leq K \leq n$

$\bar{v}_1, \bar{v}_2, \dots, \bar{v}_K \in \mathbb{R}^n$

$\bar{0} \in S$

$$S = \left\{ \sum_{i=1}^{K} t_i \bar{v}_i : t_i \in \mathbb{R} \; \forall_{i=1,\dots,K} \right\}$$

Subespaço afim de $\mathbb{R}^n$

$\{\bar{w} + \bar{v} : \bar{v} \in S\}$ subespaço vetorial

$$(\vec{v} \cdot \vec{u})\,\bar{u} = P_{\bar{u}} \cdot \bar{v}$$

$\hookrightarrow$ projeção de $\vec{v}$ na direção de $\bar{u}$

$$\bar{v} - P_{\bar{u}} \cdot \bar{v} = \bar{v} - (\bar{v} \cdot \bar{u})\bar{u}$$

$$\bar{u} \cdot (\bar{v} - (\bar{v} \cdot \bar{u})\bar{u}) = \bar{u} \cdot \bar{v} - (\bar{v} \cdot \bar{u})\underbrace{(\bar{u} \cdot \bar{u})}_{\bar{u}^2 = \|u\|^2 = 1^2 = 1} = 0$$

$A, B \subset \mathbb{R}^n$

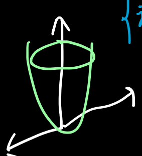
$$d_{A,B} = \inf\{\|\bar{x} - \bar{y}\| : \bar{x} \in A, \bar{y} \in B\}$$

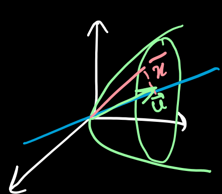
Distância de $\bar{v}$ à reta def por $\bar{u}$ q passa por $\bar{0}$, com $\|\bar{u}\| = 1$; é $\|\bar{v} - P_{\bar{u}}\bar{v}\|$.

$\boxed{\text{Parabolóide}}$

$$\{(x, y, x^2 + y^2) : x, y \in \mathbb{R}\}$$

$$\{\bar{x} \in \mathbb{R}^n : \|\bar{x} - (\bar{x} \cdot \bar{u})\bar{u}\|^2 = \alpha(\bar{x} \cdot \bar{u})\}$$

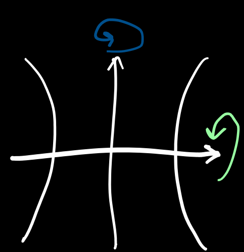




$\boxed{\text{Hiperbolóide}}$ de 1 folha / de 2 folhas

$$y = \sqrt{x^2 - 1}, \quad x \geq 1$$

$$x^2 - y^2 = 1$$



$\boxed{\text{Bolas}}$

$$B_r(\bar{a}) = \{\bar{x} \in \mathbb{R}^n : \|\bar{x} - \bar{a}\| < r\}$$

$r > 0, \; \bar{a} \in \mathbb{R}^n$

$$\bar{B}_r(\bar{a}) = \{\bar{x} \in \mathbb{R}^n : \|\bar{x} - \bar{a}\| \leq r\}$$

$$\partial B_r(\bar{a}) = \{\bar{x} \in \mathbb{R}^n : \|\bar{x} - \bar{a}\| = r\}$$

del

DEF. $A \subset \mathbb{R}^n$ é limitado se existir $B_r(\bar{x}) \supset A$