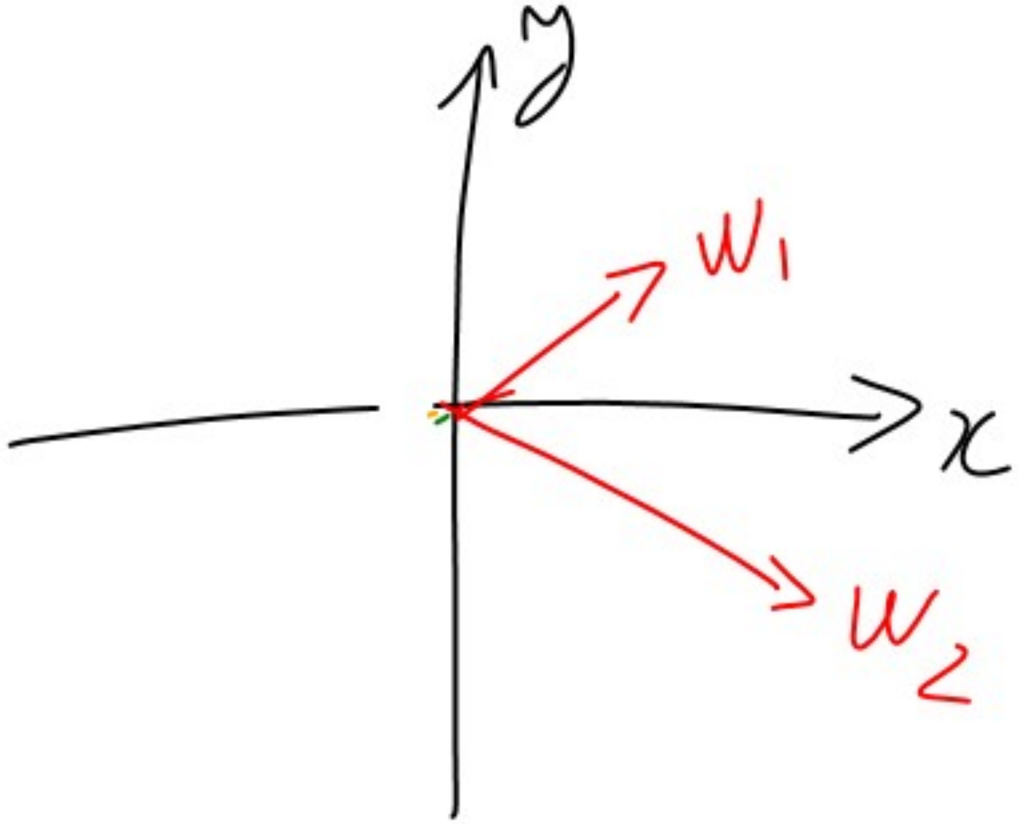
$\mathbb{V}_n$

BASE DE $\mathbb{V}_n = B_n = \{ a_1, a_2, \dots a_n \} \subset \mathbb{V}_n$

① GENERA $\mathbb{V}_n$:

$\forall\, v \in \mathbb{V}_n : \quad v = \sum_{i=1}^{n} \alpha_i a_i \qquad \alpha_i \in \mathbb{R}$

② $\{ a_1, a_2, \dots, a_n \}$ SON L. I.



$$W = \left\{ w_1 = \begin{pmatrix} w_1^1 \\ w_1^2 \end{pmatrix},\ w_2 = \begin{pmatrix} w_2^1 \\ w_2^2 \end{pmatrix} \right\}$$

$$v = \alpha_1 \begin{pmatrix} 1 \\ 0 \end{pmatrix} + \alpha_2 \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$

$$v = \begin{pmatrix} \alpha_1 \\ \alpha_2 \end{pmatrix} = \beta_1 \begin{pmatrix} w_1^1 \\ w_1^2 \end{pmatrix} + \beta_2 \begin{pmatrix} w_2^1 \\ w_2^2 \end{pmatrix}$$

$$\begin{pmatrix} \alpha_1 \\ \alpha_2 \end{pmatrix} = \begin{pmatrix} w_1^1 & w_2^1 \\ w_1^2 & w_2^2 \end{pmatrix} \begin{pmatrix} \beta_1 \\ \beta_2 \end{pmatrix}$$

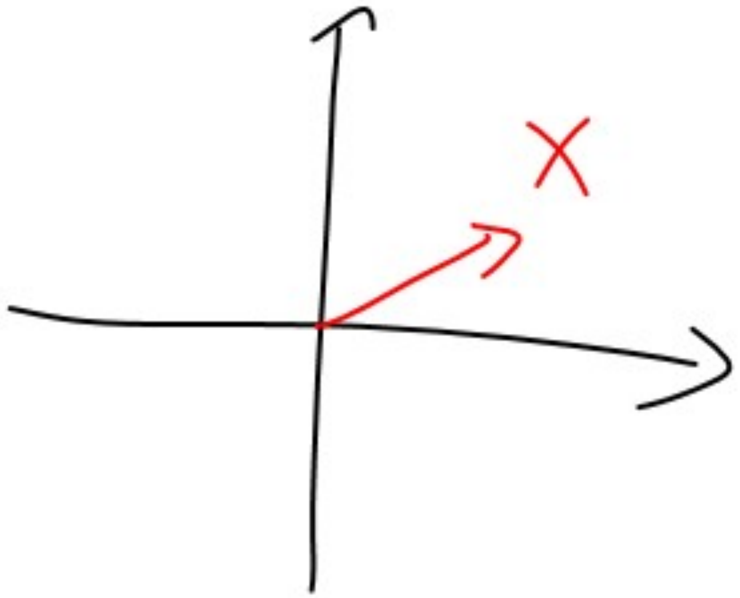
$$\begin{pmatrix} \beta_1 \\ \beta_2 \end{pmatrix} = \begin{pmatrix} w_1^1 & w_2^1 \\ w_1^2 & w_2^2 \end{pmatrix}^{-1} \begin{pmatrix} \alpha_1 \\ \alpha_2 \end{pmatrix}$$

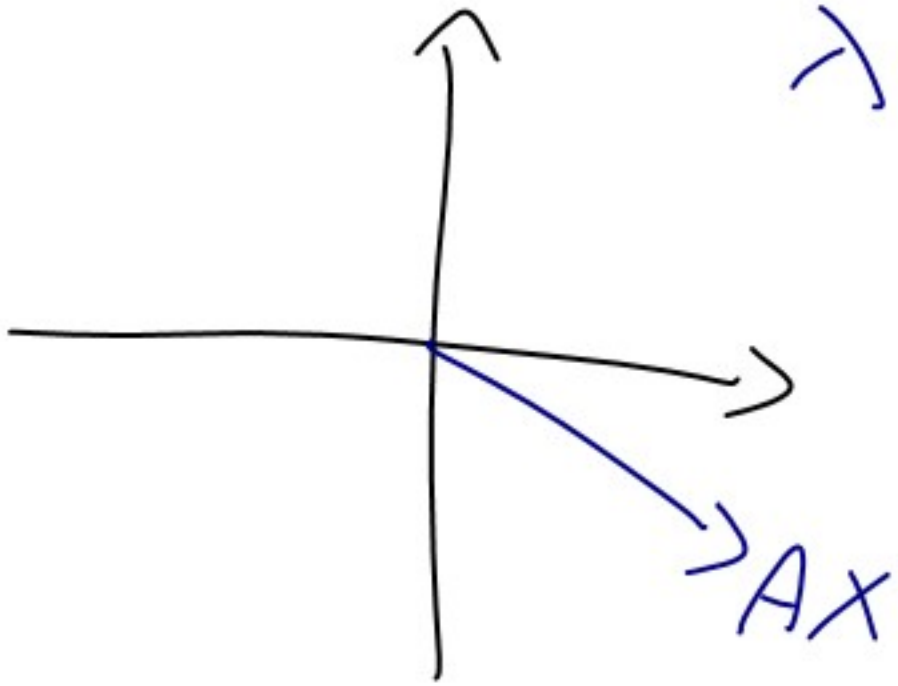
VECTORES Y VALORES PROPIOS

$$A : \mathbb{R}^m \longrightarrow \mathbb{R}^m$$
$$x \longrightarrow Ax$$

$$Av = \lambda v$$

$$\lambda \in \mathbb{R}$$
$$\lambda \in \mathbb{C}$$



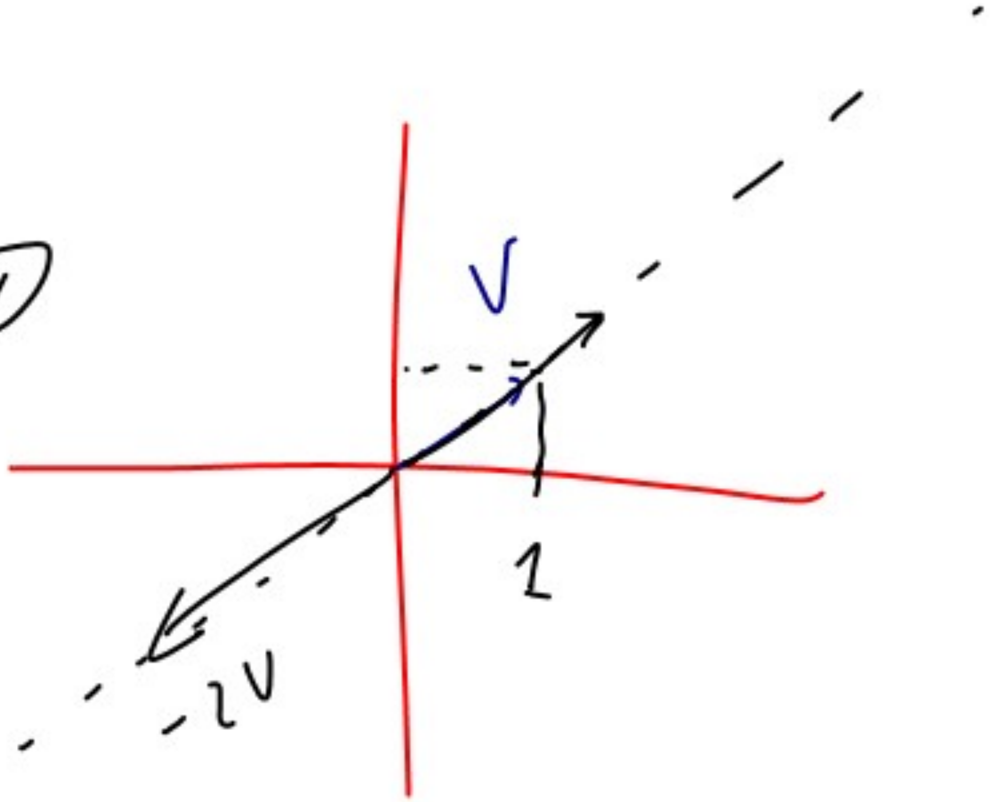


$$\alpha AV = \alpha \lambda V \qquad \lambda \in \mathbb{C}$$

$$V \neq 0$$

$$A(\alpha V) = \lambda(\alpha V)$$

$$\alpha \neq 0$$



$$A(-2V) = \lambda(-2V)$$

$$\cancel{-2} AV = \lambda V \cancel{(-2)}$$

$$AV = \lambda V$$

$$AV = \lambda V$$

$$AV - \lambda V = 0$$

$$AV - \lambda I V = 0$$

$$(A - \lambda I)V = 0$$

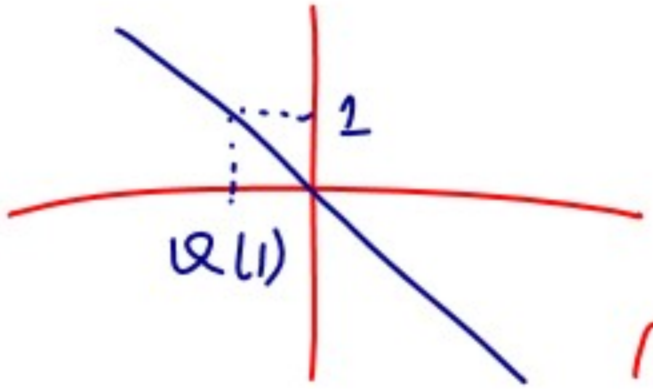
$$|A - \lambda I| = 0$$

$$\exists\ \cancel{(A - \lambda I)^{-1}}$$

$$V = (A - \lambda I)^{-1} 0$$

$$V = 0$$

$$A = \begin{pmatrix} 1 & -2 \\ -2 & -1 \end{pmatrix}$$



$$\left| \begin{pmatrix} 1 & -2 \\ -2 & -1 \end{pmatrix} - \lambda \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \right| =$$

$$\begin{vmatrix} 1-\lambda & -2 \\ -2 & -1-\lambda \end{vmatrix} = -(1-\lambda)(1+\lambda) - 4 = 0$$

$\pm\sqrt{5}$

$$\begin{pmatrix} +1 & -2 \\ -2 & -1 \end{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix} = \sqrt{5} \begin{pmatrix} a \\ b \end{pmatrix}$$

$$+1 \cdot a - 2b = +a\sqrt{5}$$

$$a = \frac{2}{1-\sqrt{5}}$$

$$b = 1$$

EC. DIF

$$\begin{pmatrix} \dot{x} \\ \dot{y} \end{pmatrix} = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

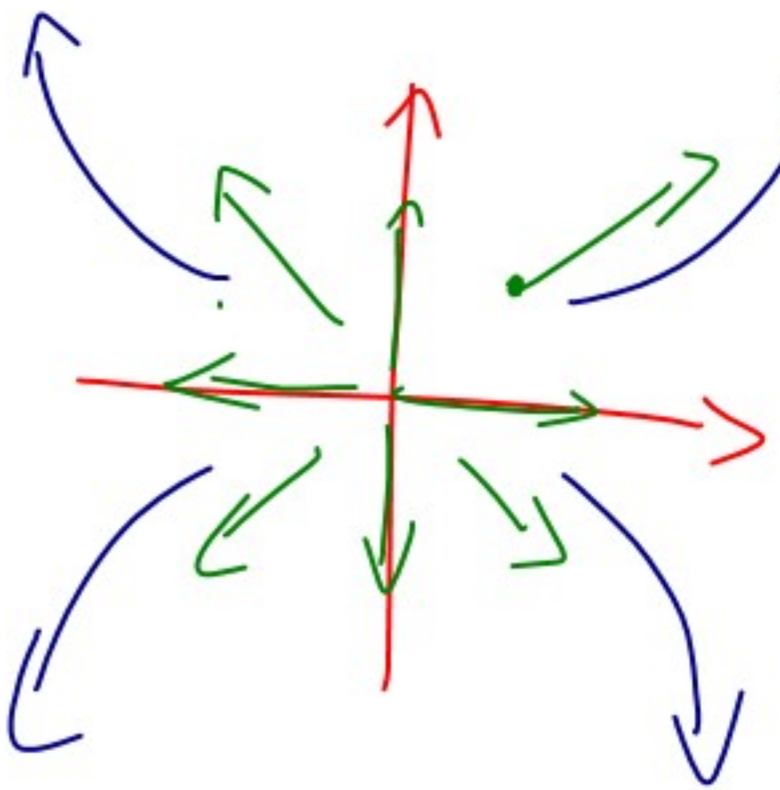
A $\lambda_1, \lambda_2 \in \mathbb{R}$ $\qquad \lambda_1 \neq \lambda_2$

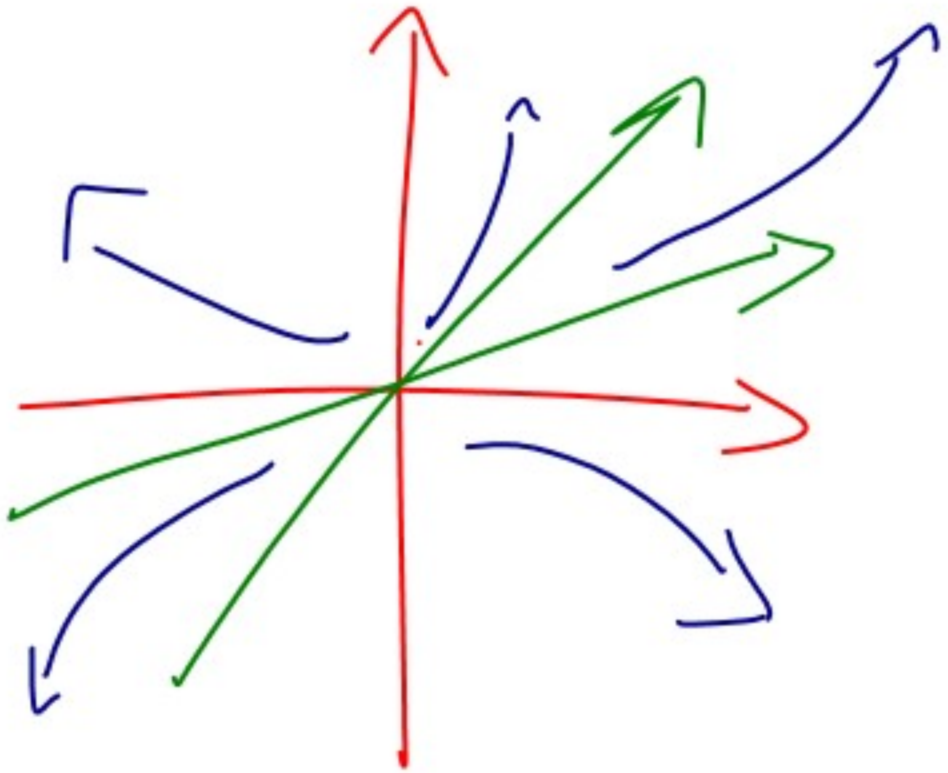
$$\begin{array}{cc} \lambda_1 & \lambda_2 \\ \Downarrow & \Downarrow \\ V_1 & V_2 \end{array}$$

$$P = \begin{bmatrix} V_1 & V_2 \end{bmatrix}$$

$$\begin{pmatrix} \dot{x} \\ \dot{y} \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$$

$$\begin{pmatrix} x_t \\ y_t \end{pmatrix} = \begin{pmatrix} x_0 e^{t} \\ y_0 e^{2t} \end{pmatrix}$$





$$A = \begin{bmatrix} a_1 & a_2 & \cdots & a_n \end{bmatrix}$$

① $\exists A^{-1}$

$\Longleftrightarrow$ ② $\{a_1, a_2, \ldots, a_n\}$ SEAN L.I.

$\Longleftrightarrow$ ③ $|A| \neq 0$