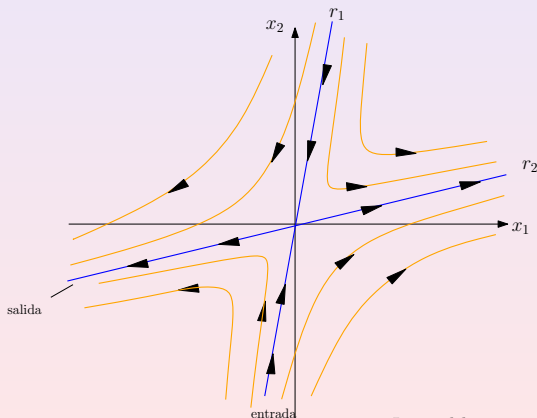


Clasificación de Sistemas Lineales Homogéneos 2D

$$X' = AX$$

$X = (x_1, x_2)^T$, λ_1, λ_2 son VAPs de A , v_1, v_2 VEPs de A , $r_{1,2} = [v_{1,2}]$

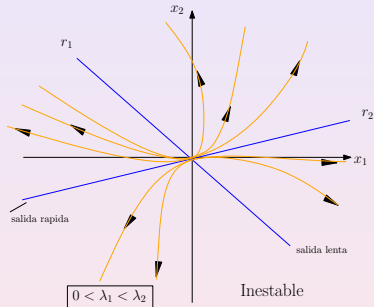
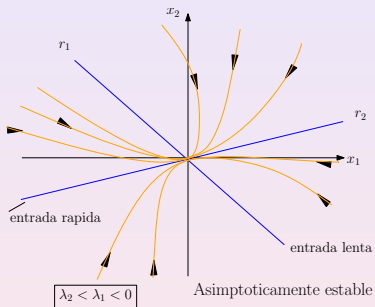
1. Silla:



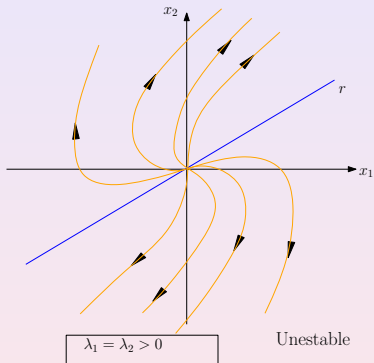
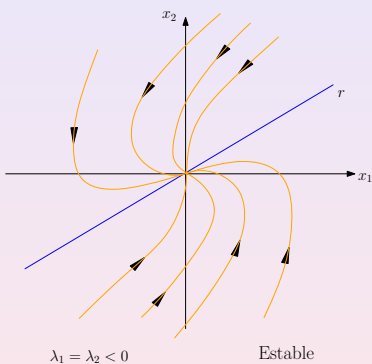
Inestable

$$\lambda_1 < 0 < \lambda_2$$

2. Nodos (propios): A diagonalizable



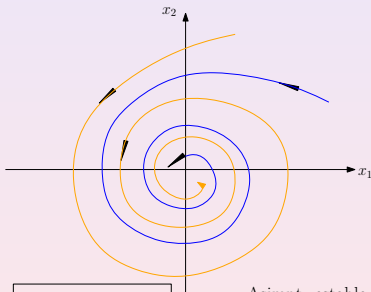
3. *Nodos impropios*: A no diagonalizable y $\lambda_1 = \lambda_2 \leq 0$:



4. Focos: Existe el cambio de base

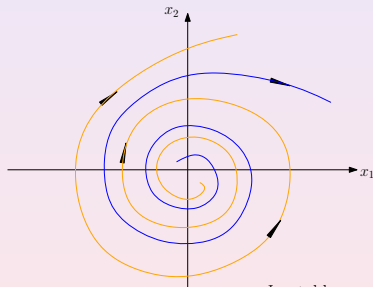
$$A = SJS^{-1}, \text{ tal que } J = \begin{pmatrix} \alpha & \beta \\ -\beta & \alpha \end{pmatrix}, \quad (\text{bloque de Jordan real } 2 \times 2)$$

El sentido de giros depende del *signo* de β



$$\lambda_{1,2} = \alpha \pm i\beta, \alpha < 0$$

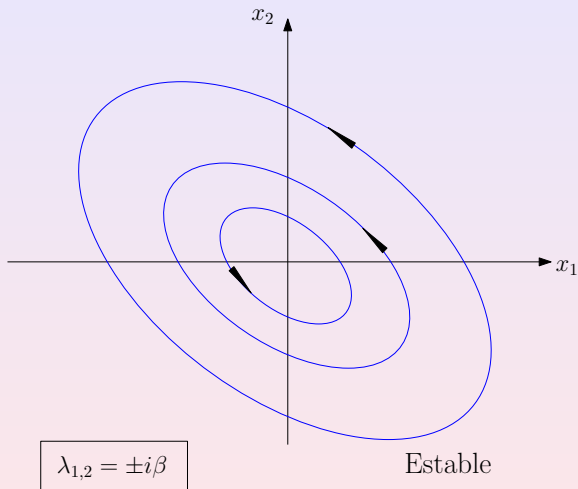
Asimpt. estable



$$\lambda_{1,2} = \alpha \pm i\beta, \alpha > 0$$

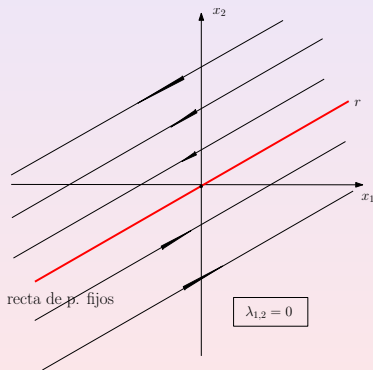
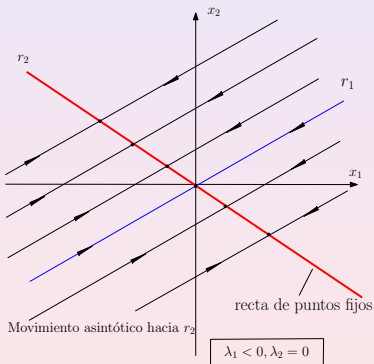
Inestable

4'. Centro



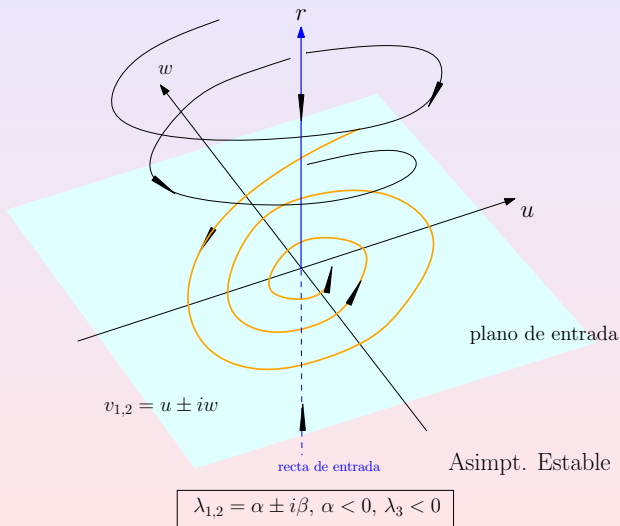
Casos degenerados: $\det A = 0$

$$A = SJS^{-1}, \quad J = J_{\pm} = \begin{pmatrix} \pm 1 & 0 \\ 0 & 0 \end{pmatrix}, \quad J = J_0 = \begin{pmatrix} 0 & 0 \\ 1 & 0 \end{pmatrix},$$

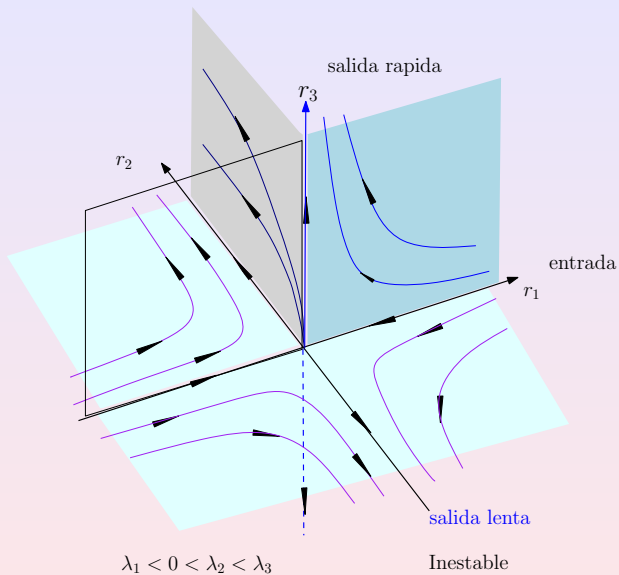


Algunos casos 3D

Nodo-foco:



Silla-nodo



Nodo 3D

