$$\dot{x} = x(x^2-1) - y = f(x,y)$$

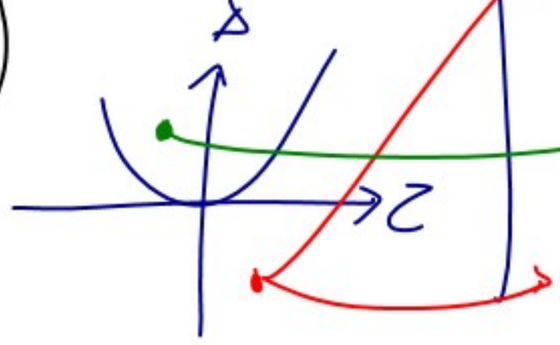
$$\dot{y} = x - y = g(x,y)$$

$$\begin{pmatrix} \dot{x} \\ \dot{y} \end{pmatrix} = \begin{pmatrix} \frac{\partial f}{\partial x} & \frac{\partial f}{\partial y} \\ \frac{\partial g}{\partial x} & \frac{\partial g}{\partial y} \end{pmatrix}\Bigg|_{\begin{pmatrix} x_0 \\ y_0 \end{pmatrix}} \begin{pmatrix} x - x_0 \\ y - y_0 \end{pmatrix}$$

$$J = \begin{pmatrix} 3x^2 - 1 & -1 \\ 1 & -1 \end{pmatrix}$$

$(-\sqrt{2}, -\sqrt{2})$

$$J = \begin{pmatrix} 5 & -1 \\ 1 & -1 \end{pmatrix}$$



$(0,0)$

$$J = \begin{pmatrix} -1 & -1 \\ 1 & -1 \end{pmatrix}$$

$(\sqrt{2}, \sqrt{2})$

$$J = \begin{pmatrix} 5 & -1 \\ 1 & -1 \end{pmatrix}$$

$\dot{x}=0 \qquad y=x(x^2-1)$

$\dot{x}=x(x^2-1)-y$

$\dot{y}=0 \qquad y=x$

$\dot{x}=0=x(x^2-1)-y$

$\dot{y}=0=x-y$