

Example 1:

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

$$\dot{y} = 1 - xy$$

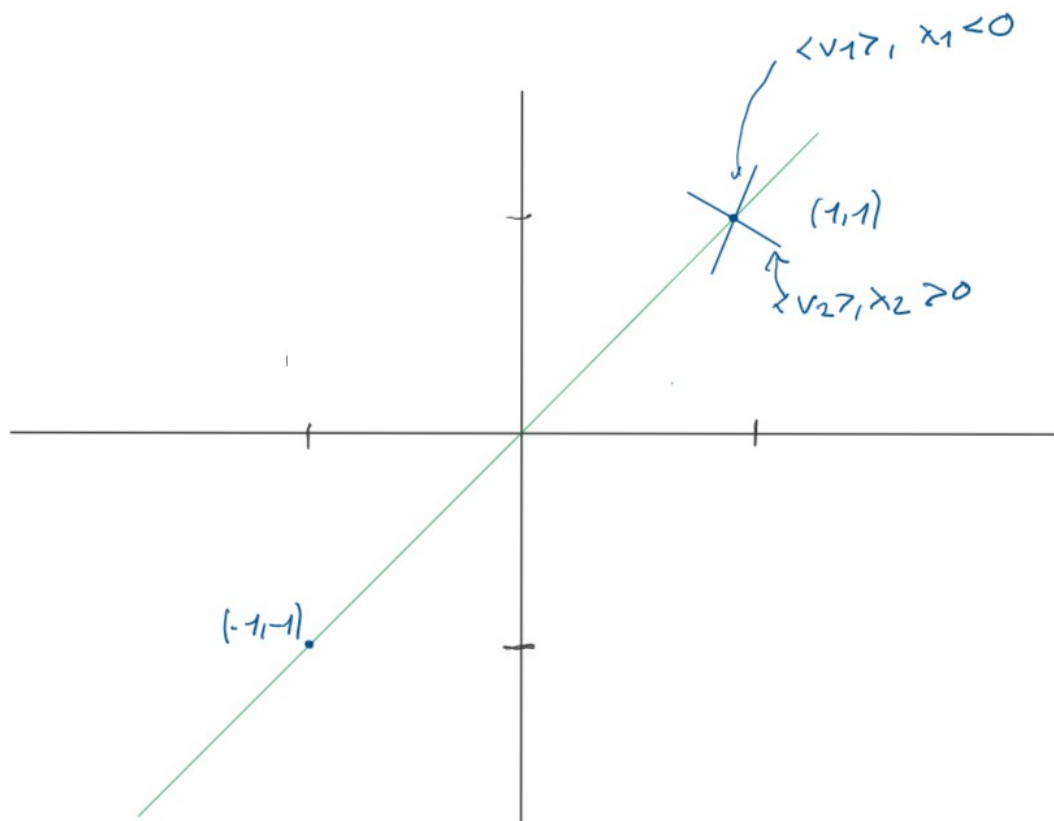
Nullclines: vert. $y = x$

horiz. $y = \frac{1}{x}$

Crit. points, e.val., e vect.

$$(1, 1) \quad \lambda_1 = -\sqrt{2} \quad v_1 = \begin{pmatrix} 1 \\ 1+\sqrt{2} \end{pmatrix}, \quad \lambda_2 = \sqrt{2} \quad v_2 = \begin{pmatrix} 1 \\ 1-\sqrt{2} \end{pmatrix}$$

$$(-1, -1) \quad \lambda = 1 \pm i$$



Example 4:

$$\dot{x} = (3-x-2y)x$$

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

Mullclines: vert: $x=0$, $y = -\frac{1}{2}x + \frac{3}{2}$

hor.: $y=0$, $y = -x+2$

Crit. points, eval & e vect:

$(0,0)$ with $\lambda_1 = 3$, $v_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$, $\lambda_2 = 2$, $v_2 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$

$(3,0)$ -- $\lambda_1 = -3$, $v_1 = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$, $\lambda_2 = -1$, $v_2 = \begin{pmatrix} -3 \\ 1 \end{pmatrix}$

$(0,2)$ -- $\lambda_1 = -2$, $v_1 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$, $\lambda_2 = -1$, $v_2 = \begin{pmatrix} -1 \\ -2 \end{pmatrix}$

$(1,1)$ -- $\lambda_1 = -1-\sqrt{2}$, $v_1 = \begin{pmatrix} \sqrt{2} \\ 1 \end{pmatrix}$, $\lambda_2 = -1+\sqrt{2}$, $v_2 = \begin{pmatrix} -\sqrt{2} \\ 1 \end{pmatrix}$

