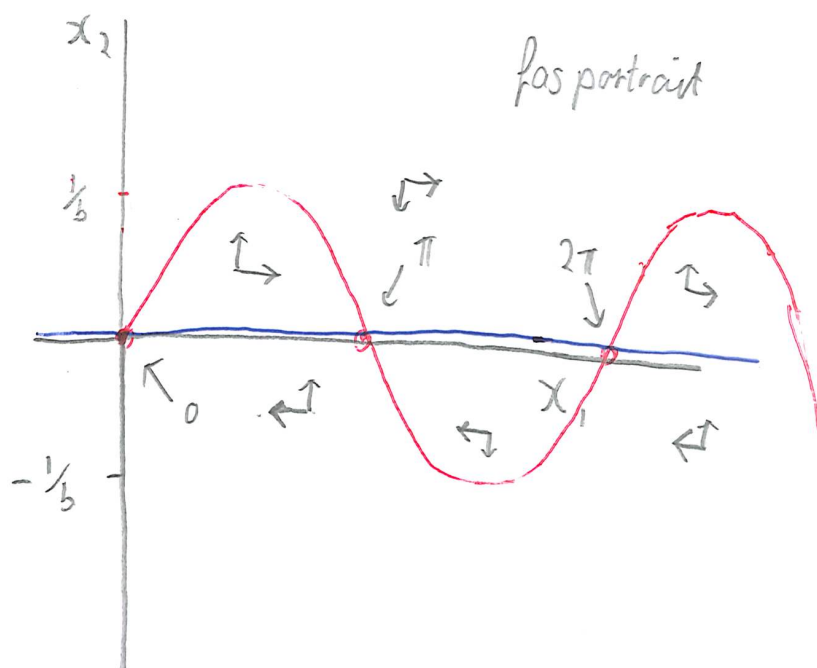$$\dot{x}_1 = f_1(x_1, x_2) = x_2$$

$$\dot{x}_2 = f_2(x_1, x_2) = \sin(x_1) - b x_2$$

f-nullclines
$$x_2 = 0$$

g-nullclines
$$x_2 = \frac{\sin(x_1)}{b}$$

fas portrait

$$x_{1*} = 0, \pi, 2\pi, \ldots \qquad \text{Jämnvihtspunkten}$$

$$x_{2*} = 0 \qquad x_* = (0,0), (\pi, 0), (2\pi, 0), \ldots$$

Jackobian A

$$\frac{\partial f_1}{\partial x_1} = 0 \qquad \frac{\partial f_1}{\partial x_2} = 1$$

$$\frac{\partial f_2}{\partial x_2} = \cos(x_1) \qquad \frac{\partial f_2}{\partial x_2} = -b$$

$$A = \begin{bmatrix} 0 & 1 \\ \cos(x_1) & b \end{bmatrix}_{x = x_*}$$

Fall 1

$$x_* = (n \cdot 2\pi, 0)$$

$$A = \begin{bmatrix} 0 & 1 \\ 1 & -b \end{bmatrix}$$

Fall 2

$$x_* = [n\pi, 0]$$

$$A = \begin{bmatrix} 0 & 1 \\ -1 & -b \end{bmatrix}$$

$y = x_1 \quad \Rightarrow \quad C = \begin{bmatrix} \dfrac{\partial h}{\partial x_1} & \dfrac{\partial h}{\partial x_2} \end{bmatrix} = \begin{bmatrix} 1, 0 \end{bmatrix}$

$\equiv h(x_1, x_2)$

$$B = \begin{bmatrix} 0 & 0 \end{bmatrix}^T \quad \text{(ungen insignal)}$$