$$x' = \begin{bmatrix} 1 & 1 \\ 4 & 1 \end{bmatrix} x$$

$$\lambda = \frac{1+1}{2} \pm \frac{\sqrt{2^2 - 4\cdot(1\cdot 1 - 1\cdot 4)}}{2} = 3, -1$$

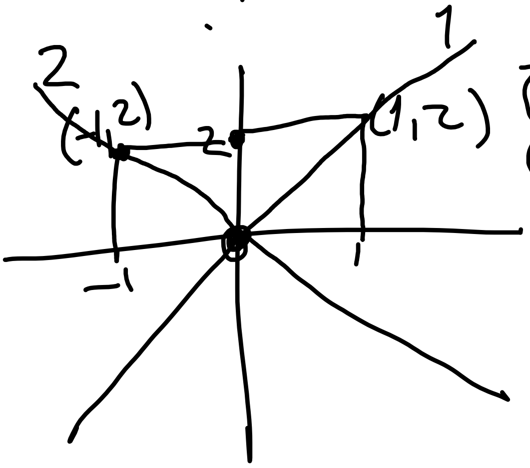
$$\xi_1 = \begin{bmatrix} 3-1 \\ 4 \end{bmatrix}, \quad \xi_2 = \begin{bmatrix} -1-1 \\ 4 \end{bmatrix} \Rightarrow \xi_1 = \begin{pmatrix} 1 \\ 2 \end{pmatrix}, \xi_2 = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$$

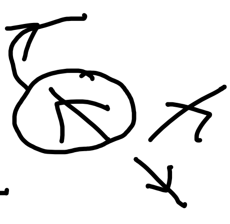
$$x = \underbrace{c_1 \begin{pmatrix} 1 \\ 2 \end{pmatrix} e^{3t}}_{\text{dominates}} + c_2 \begin{pmatrix} -1 \\ 2 \end{pmatrix} \underline{e^{-t}} \approx \begin{pmatrix} 1 \\ 2 \end{pmatrix} e^{3t} = \begin{pmatrix} e^{3t} \\ 2\cdot e^{3t} \end{pmatrix}$$

If $x(0) = \begin{pmatrix} -1 \\ 2 \end{pmatrix} \Rightarrow \begin{pmatrix} -1 \\ 2 \end{pmatrix} = c_1 \begin{pmatrix} 1 \\ 2 \end{pmatrix} + c_2 \begin{pmatrix} -1 \\ 2 \end{pmatrix}$

$$\Rightarrow c_1 = 0$$

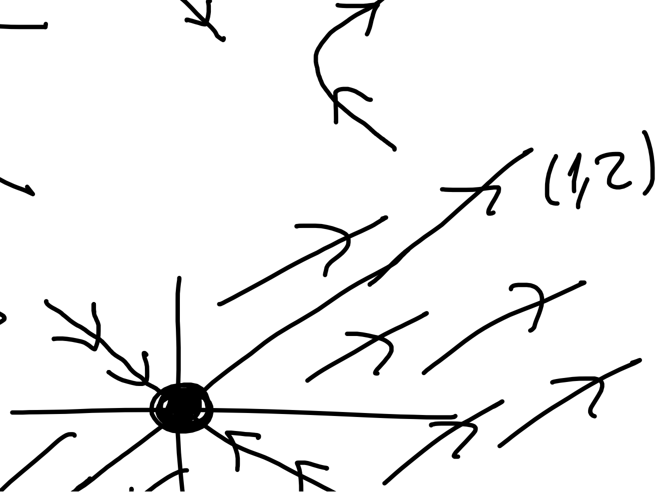
$$x(t) = \begin{pmatrix} -1 \\ 2 \end{pmatrix} e^{-t} \longrightarrow (0,0)$$





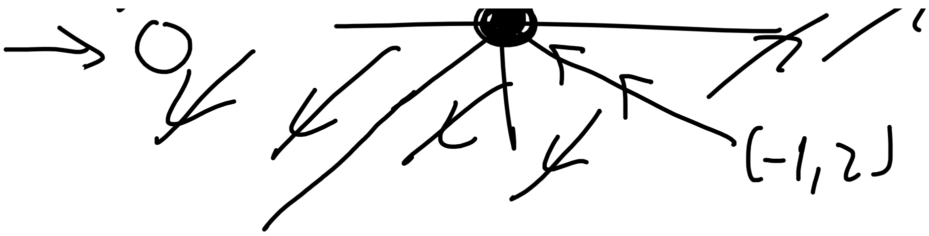
As $t \to +\infty$

$$X(t) \approx \begin{pmatrix} e^{3t} \\ 2\cdot e^{3t} \end{pmatrix}$$



$x(t) = \begin{pmatrix} -1 \\ 2 \end{pmatrix} e^{-t}$

$\longrightarrow 0$



$$\frac{dx}{dt} = \begin{bmatrix} -1 & 2 \\ 4 & -3 \end{bmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} -1 \\ -1 \end{pmatrix}$$

$$= Ax + e$$

1) $x \equiv$ constantsh. $\Rightarrow \frac{dx}{dt} = 0$

2) $Ax + e = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \Rightarrow Ax = -e$

$$\Rightarrow x = A^{-1}(-e)$$

$$= \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$X = X_{hm} + \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\frac{dX_{hm}}{dt} = \begin{bmatrix} 1 & -2 \\ 4 & -3 \end{bmatrix} \begin{pmatrix} x_{hm} \\ y_{hm} \end{pmatrix}$$

1) $\lambda = \frac{1-3}{2} \pm \sqrt{4 - 4 \cdot (-}$