

Nonlinear System of DE

02/27/12

① Autonomous System

$$\begin{cases} x' = f(x, y) \\ y' = g(x, y) \end{cases}$$

no explicit functions of t
on the right hand side

② Equilibrium:

$$\begin{cases} f(x, y) = 0 \\ g(x, y) = 0 \end{cases}$$

corresponds to const.
solⁿs $x=c, y=d$
i.e. $x'=0, y'=0$.

③ Nullclines:

v-nullcline: $f(x, y) = 0$ $\uparrow \downarrow$

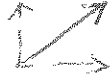
h-nullcline: $g(x, y) = 0$ $\rightarrow \leftarrow$

• The intersection of v-nullcline and h-nullcline
= the equilibria

• The v-nullcline and h-nullcline divides the phase
plane into regions:

1). $x' < 0, y' < 0$ 

2). $x' < 0, y' > 0$ 

3). $x' > 0, y' > 0$ 

4). $x' > 0,$