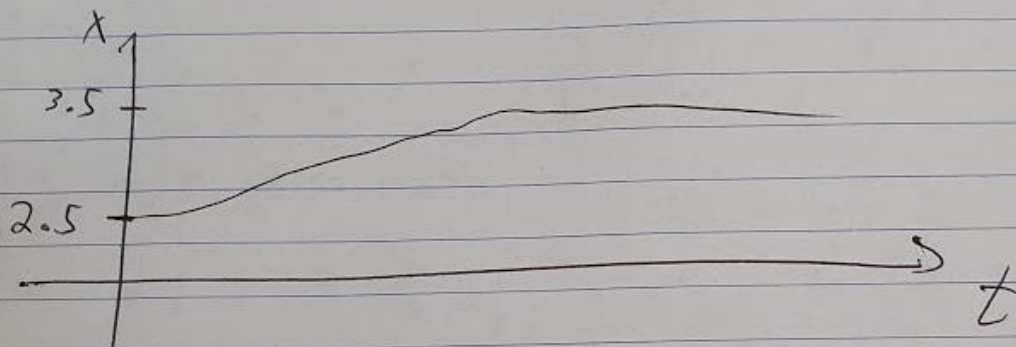


①



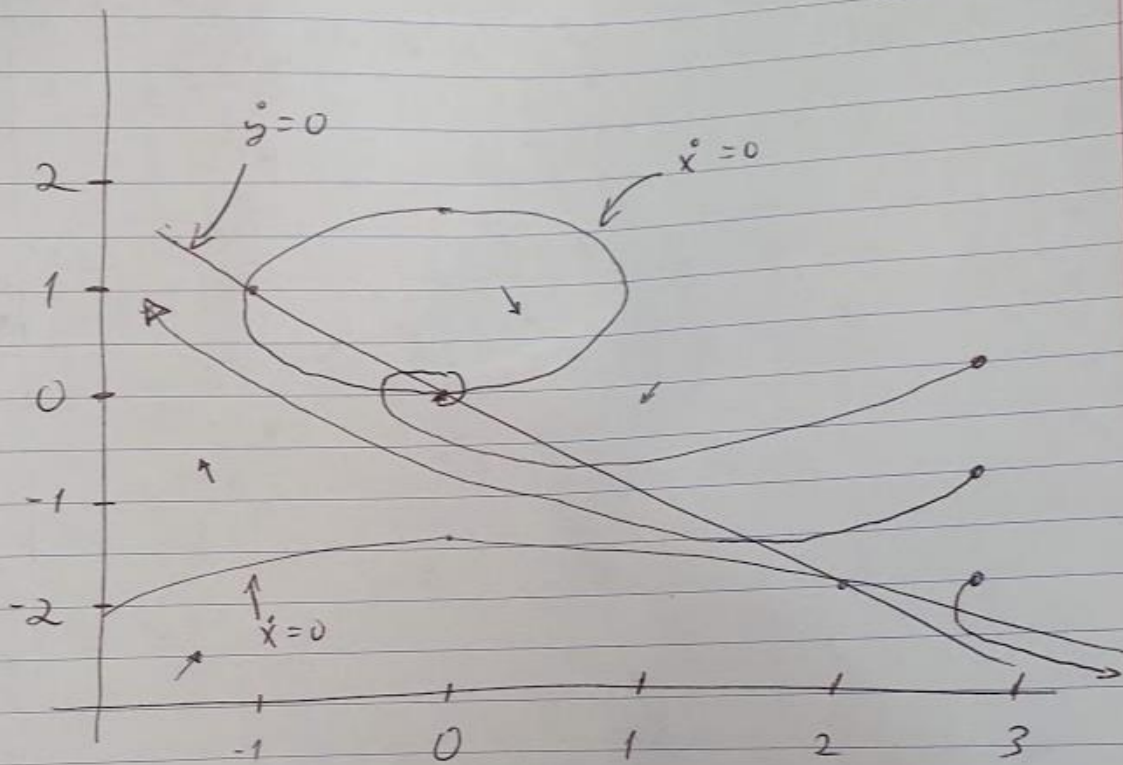
$$\dot{S}_m = -\beta S_m I_f + \nu I_m \quad \text{②}$$

$$\dot{I}_m = \beta S_m I_f - \nu I_m$$

$$\dot{S}_f = -\beta S_f I_m + \nu I_f$$

$$\dot{I}_f = \beta S_f I_m - \nu I_f$$

3



$$\dot{x} = -x^2 - y^3 + 2y$$

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

$(-1, 1), (0, 0), (3, -2)$: f_{max} f_{min}
 $\dot{y} = 0$ (3.1)
 $\dot{x} = 0$ (3.2)

(0,0) נקודה (3.3)

$$\frac{\partial^2 f(x,y)}{\partial^2(x,y)} = \begin{pmatrix} -2x & -3y^2 + 2 \\ -1 & -1 \end{pmatrix} \Big|_{(0,0)} = \begin{pmatrix} 0 & 2 \\ -1 & -1 \end{pmatrix}$$

$$\Delta = 2 \quad \tau = -1$$

$$\lambda = \frac{-1 \pm \sqrt{1-8}}{2} = -\frac{1}{2} \pm i \frac{\sqrt{7}}{2}$$

נקודה 3, נקודה 0

$$\begin{aligned} \dot{x} &< 0 & (1,0) & \text{נקודה} & (3.4) \\ \dot{y} &< 0 \end{aligned}$$