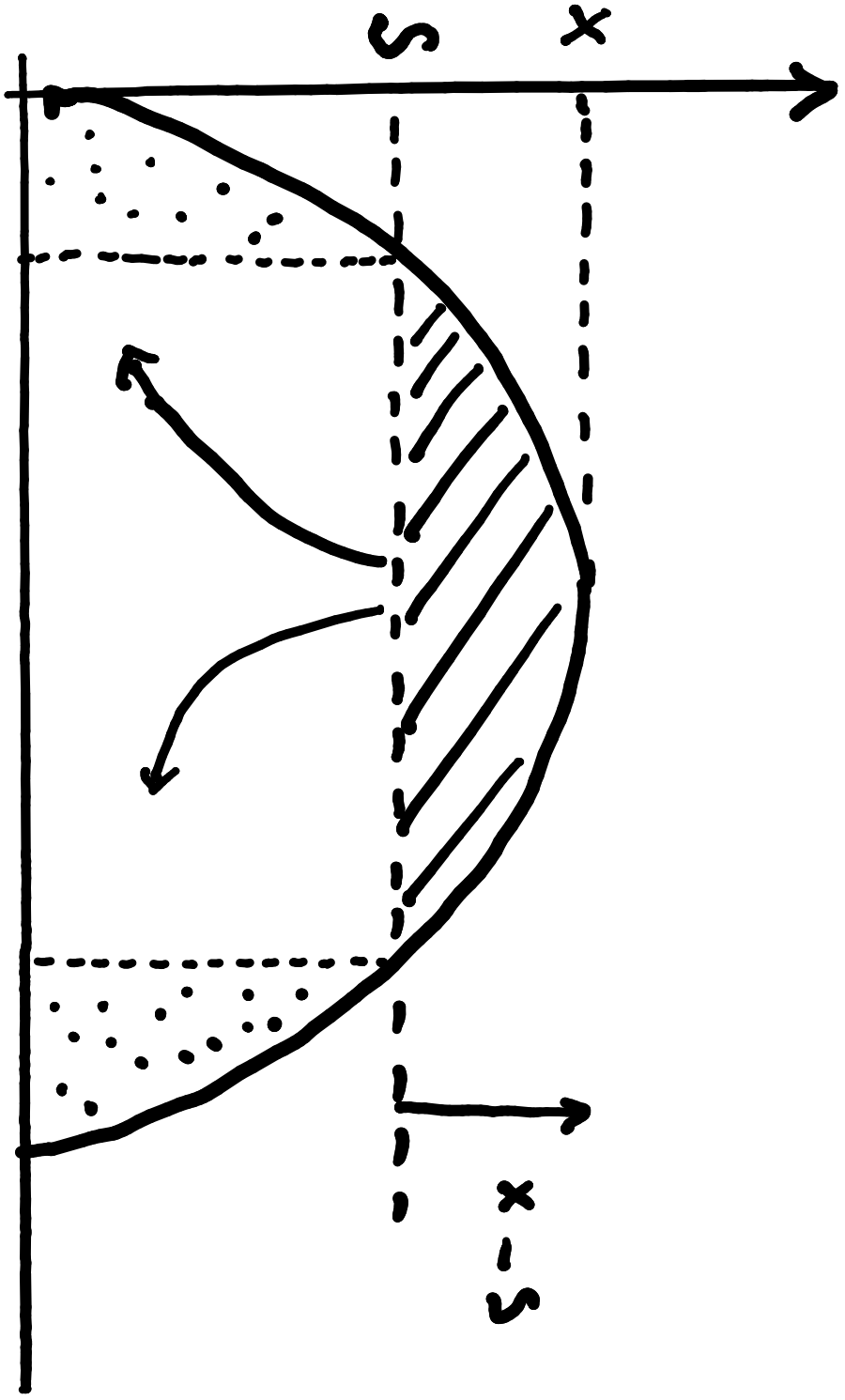
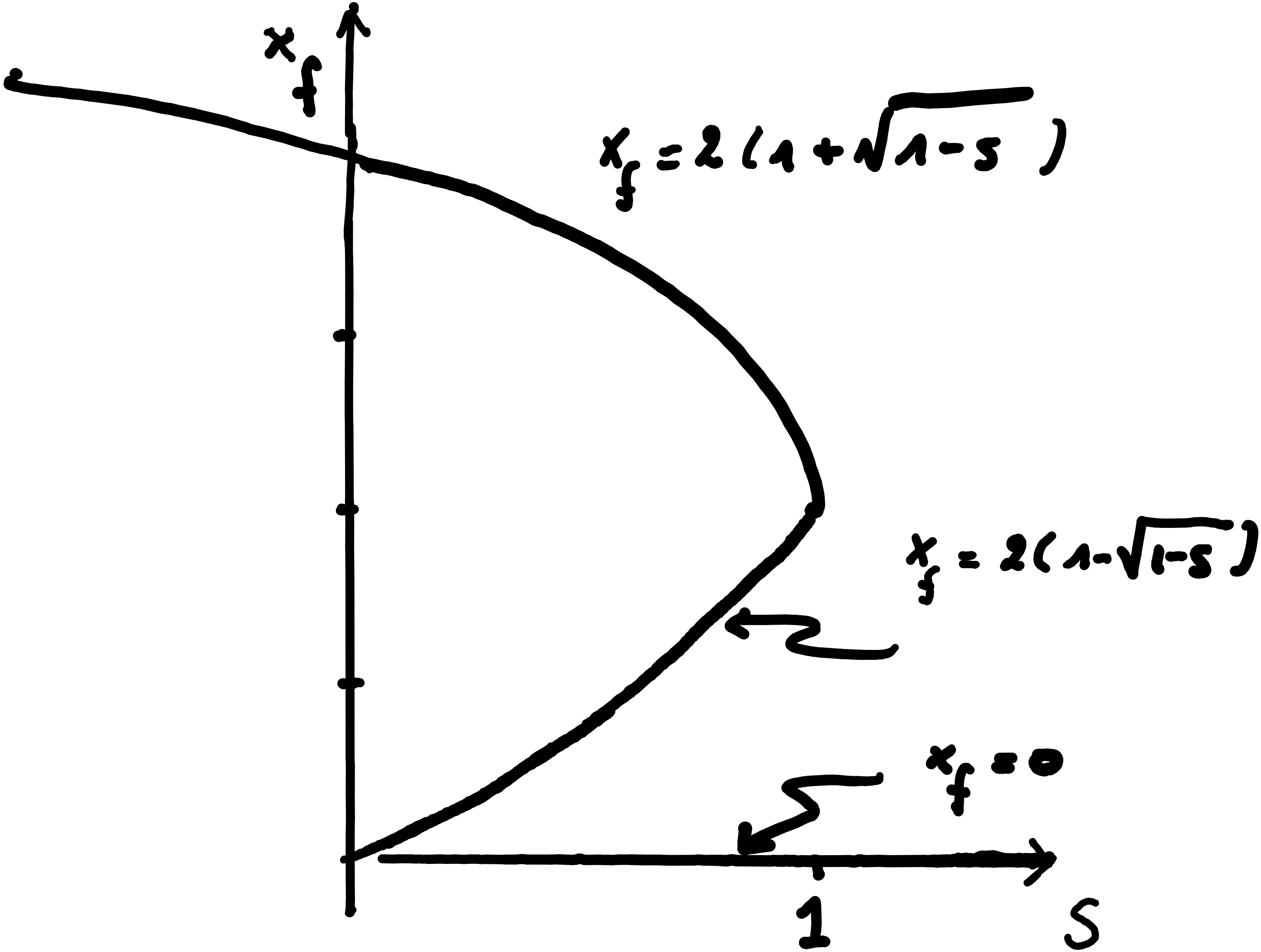
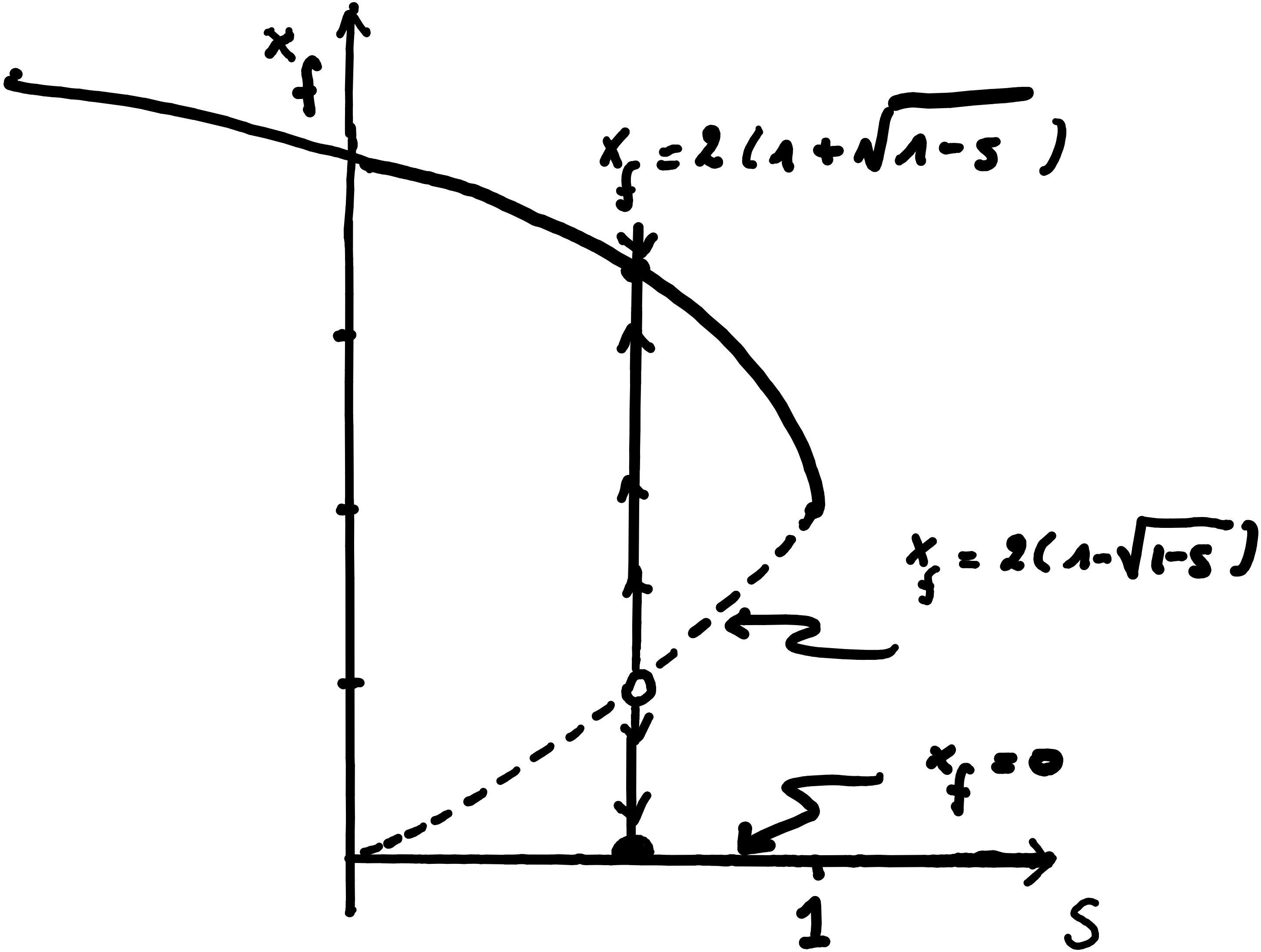
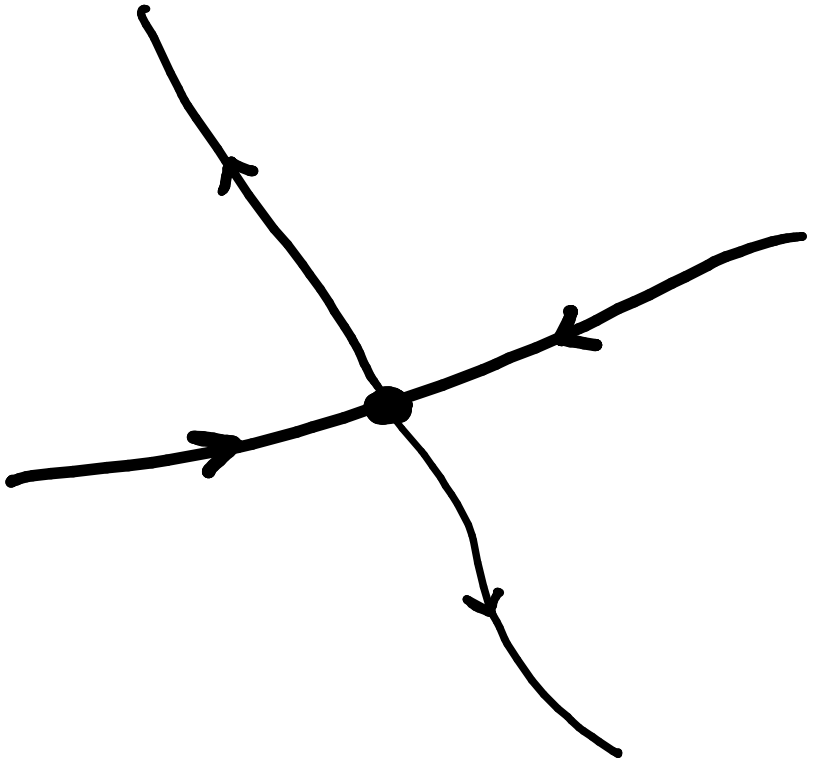

s
x
x - s

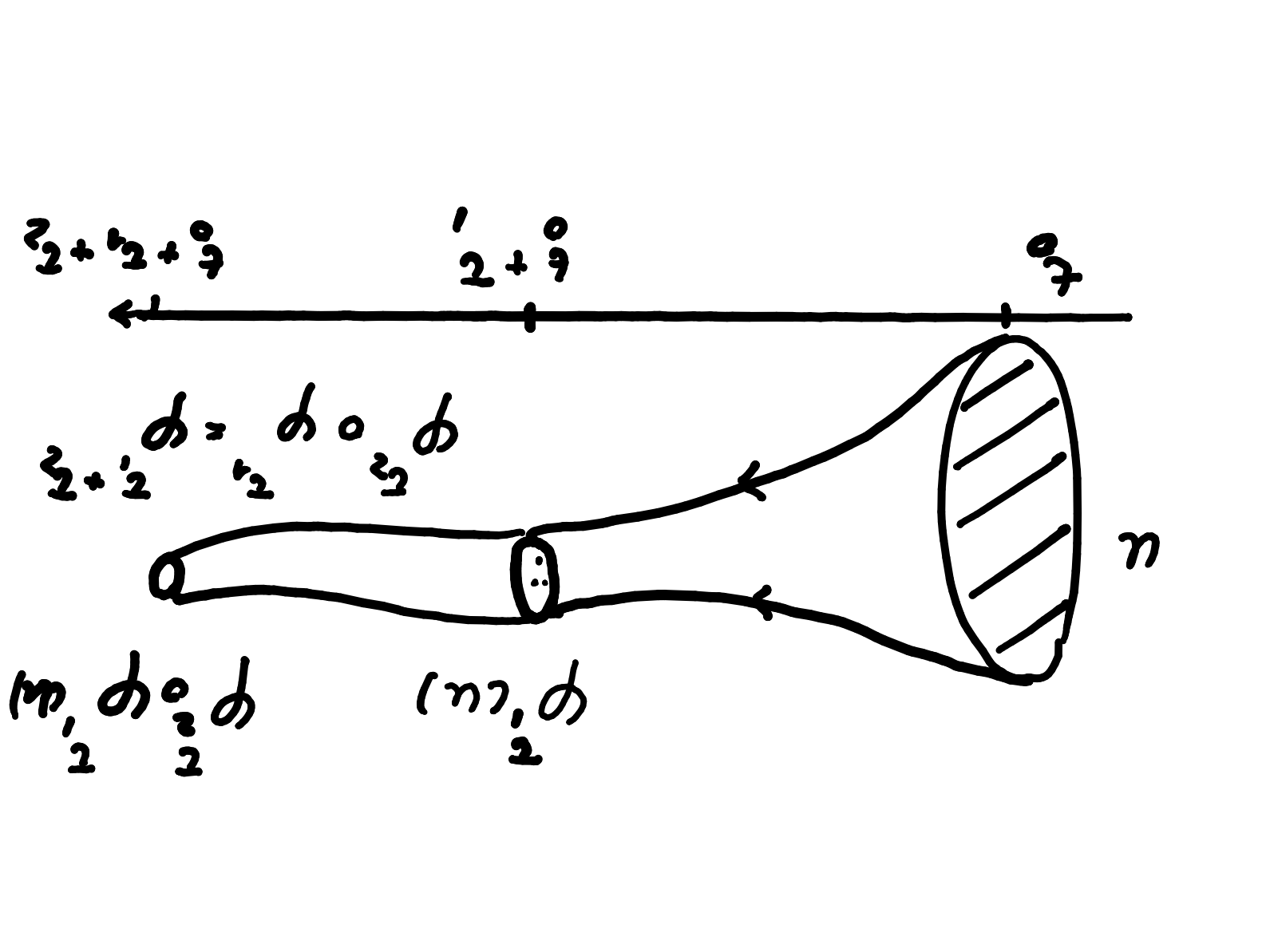


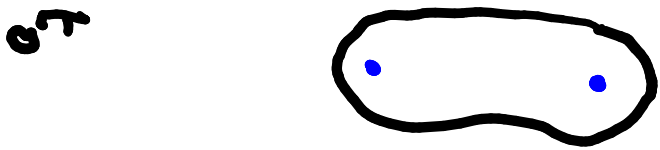
x_f
x_f = 2(1+√(1-s))
x_f = 2(1-√(1-s))
x_f = 0
1
s

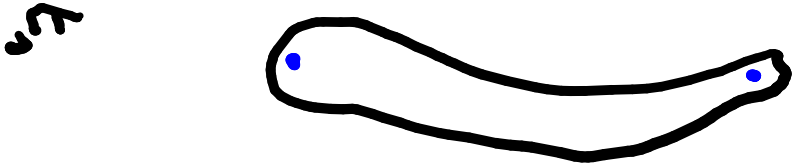


x_f
$x_f = 2(1+\sqrt{1-s})$
$x_f = 2(1-\sqrt{1-s})$
$x_f = 0$
1
S

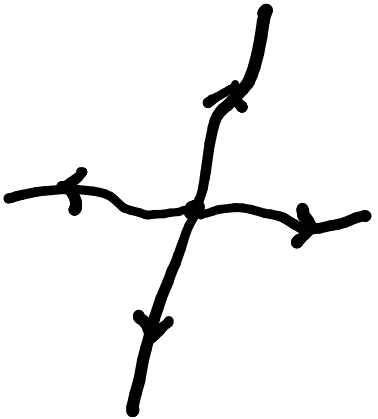




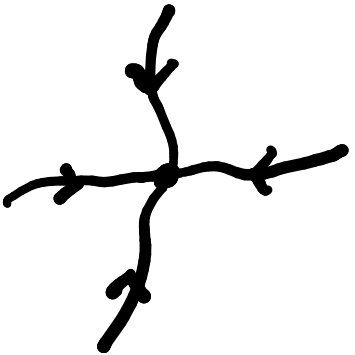




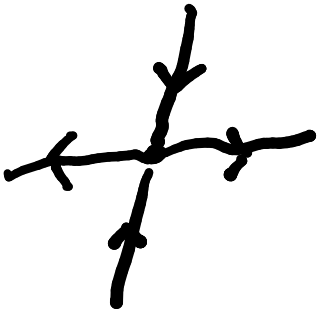
SOURCE

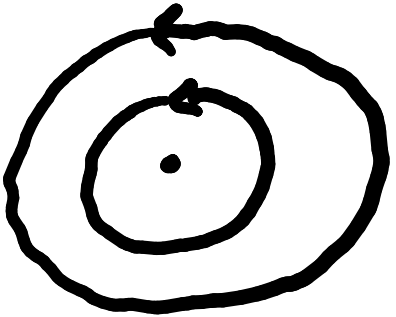


SINK



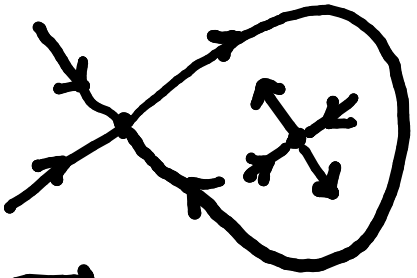
SADDLE



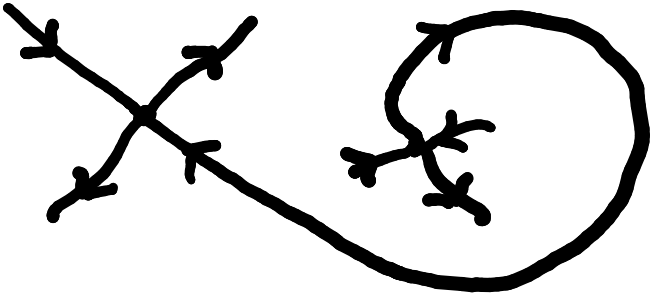


CENTER

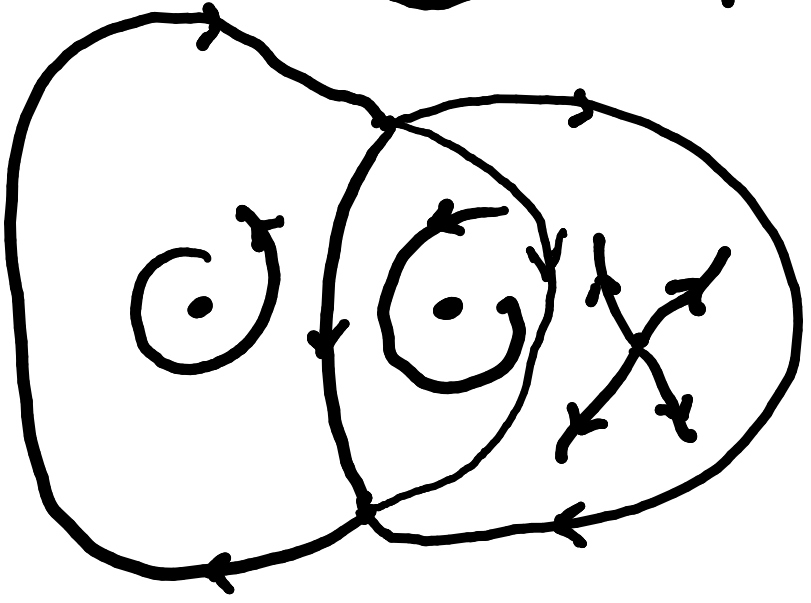
(a)



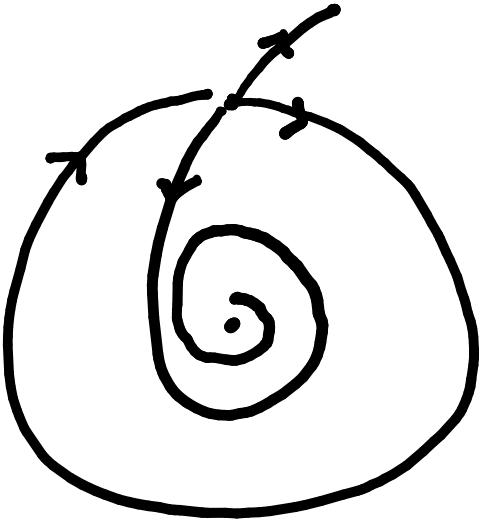
(b)

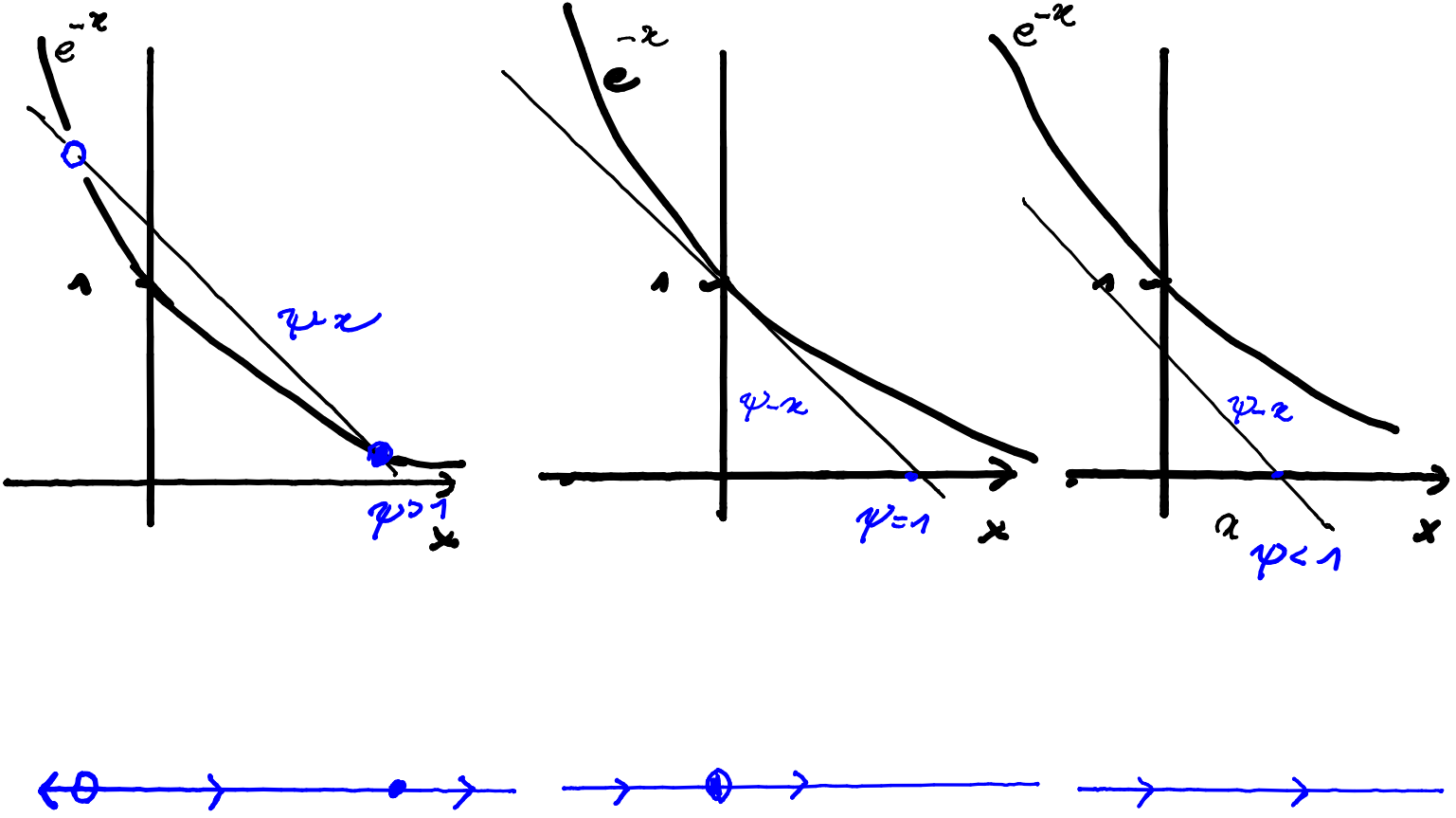


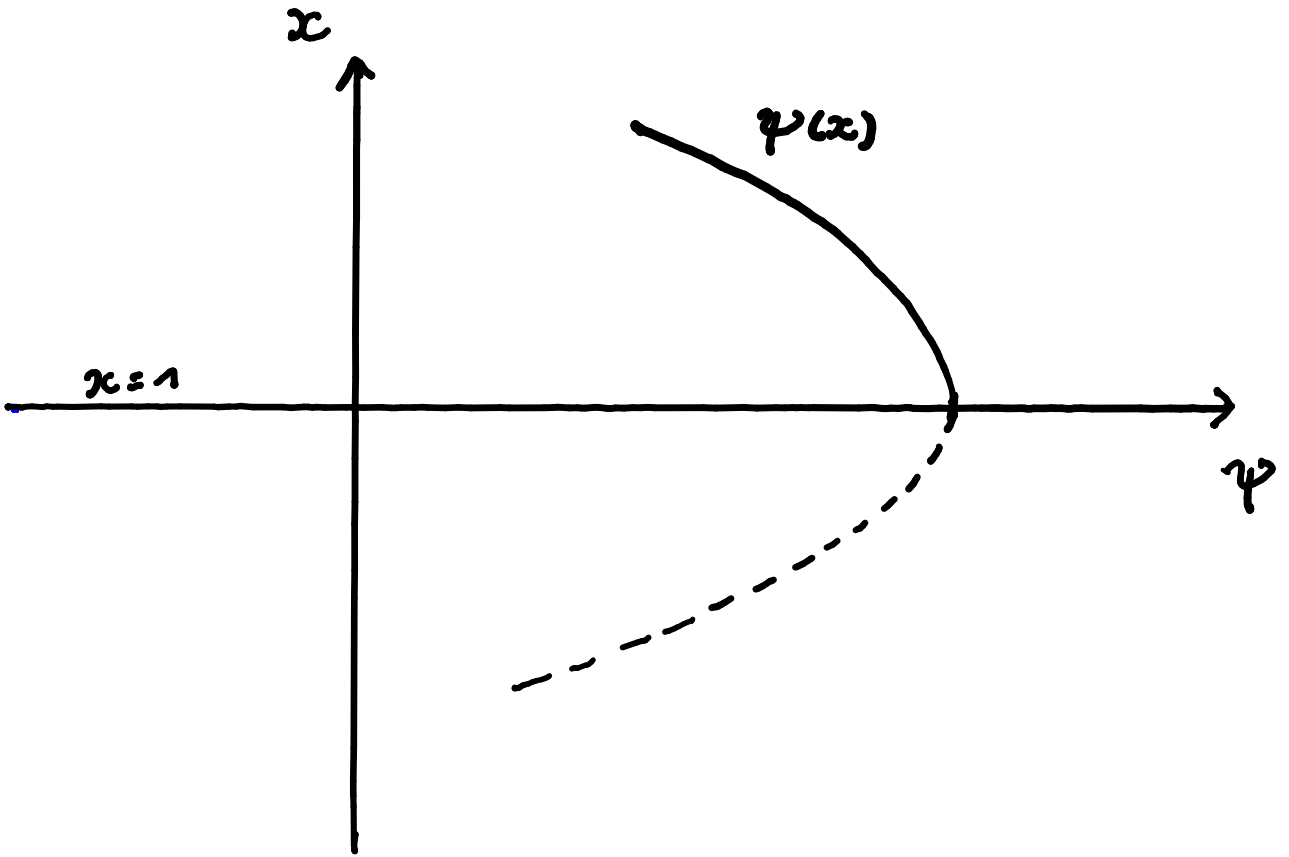
(c)

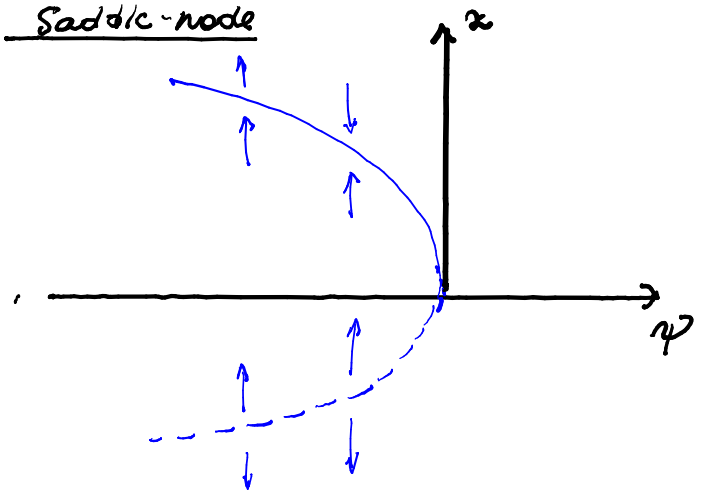


(d)

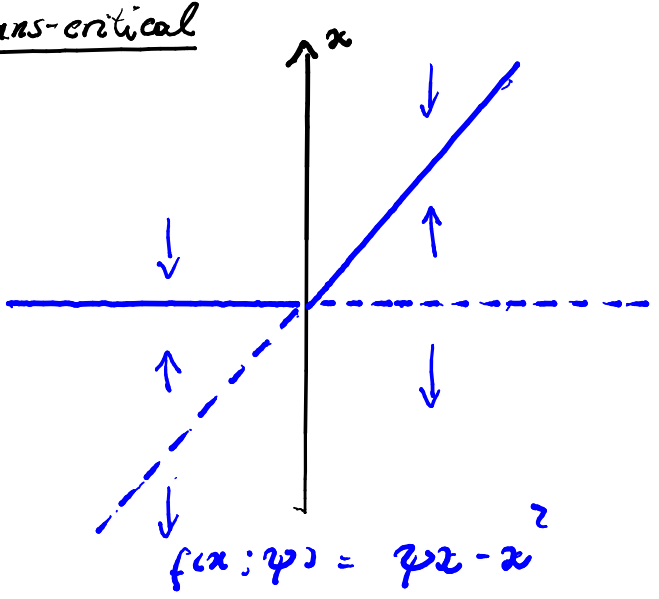



e^{-x}
1
ψx
$\psi > 1$
x
e^{-x}
1
ψx
$\psi = 1$
x
e^{-x}
1
ψx
a
$\psi < 1$
x

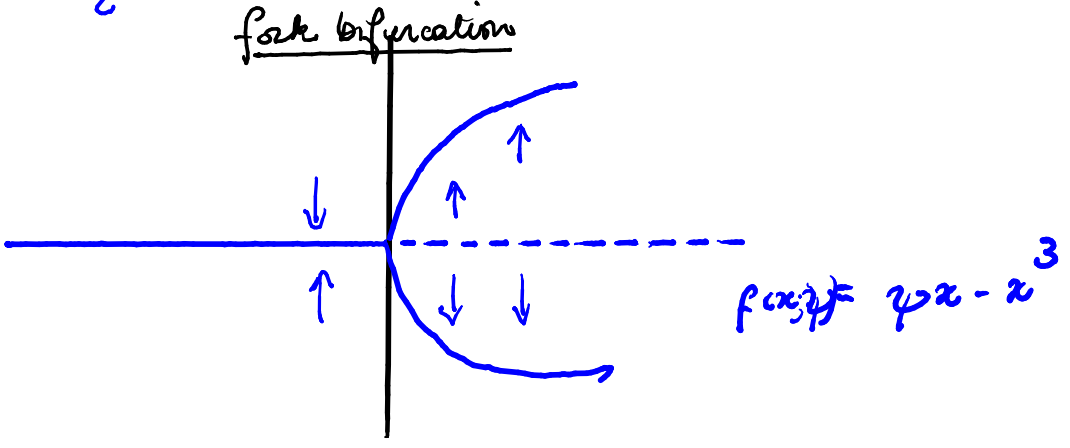

x
ψ(x)
x=1
ψ



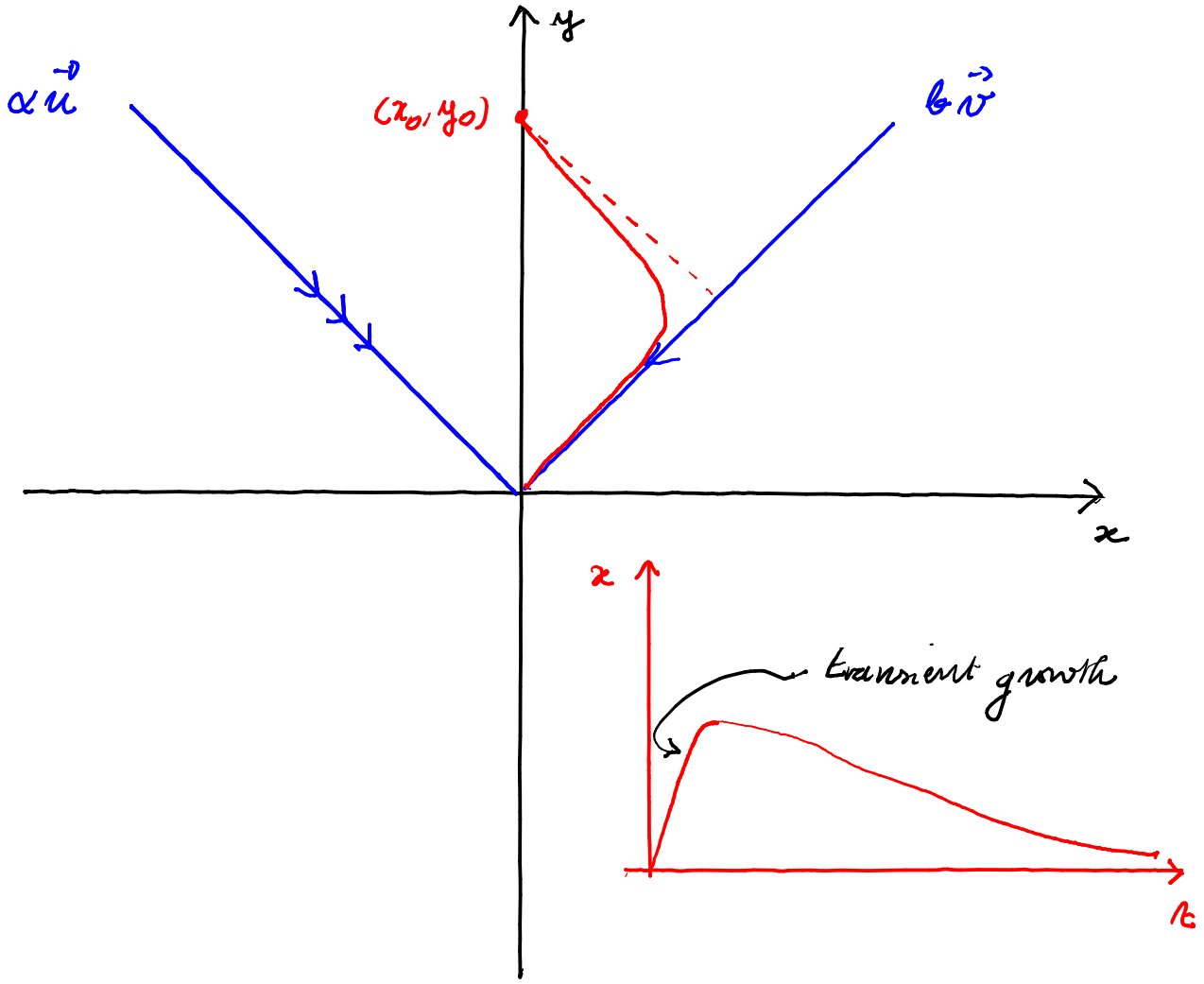
$f(x;\psi) = \psi - \frac{1}{2}x^2$

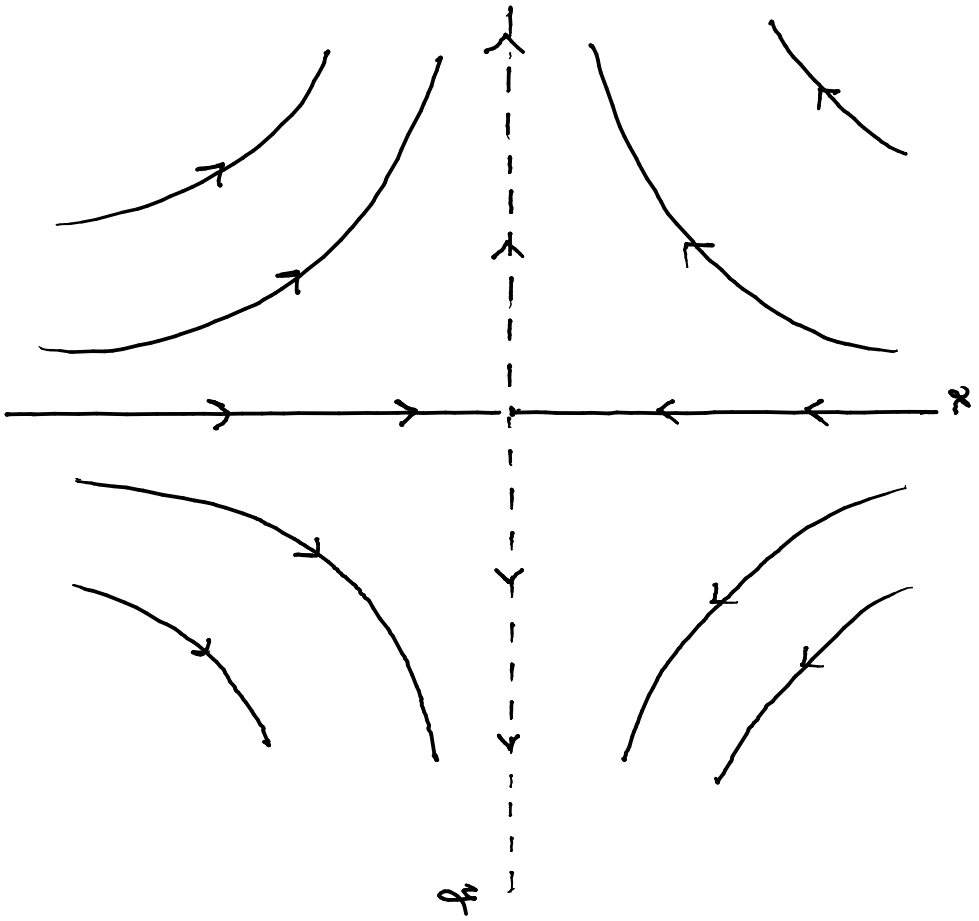


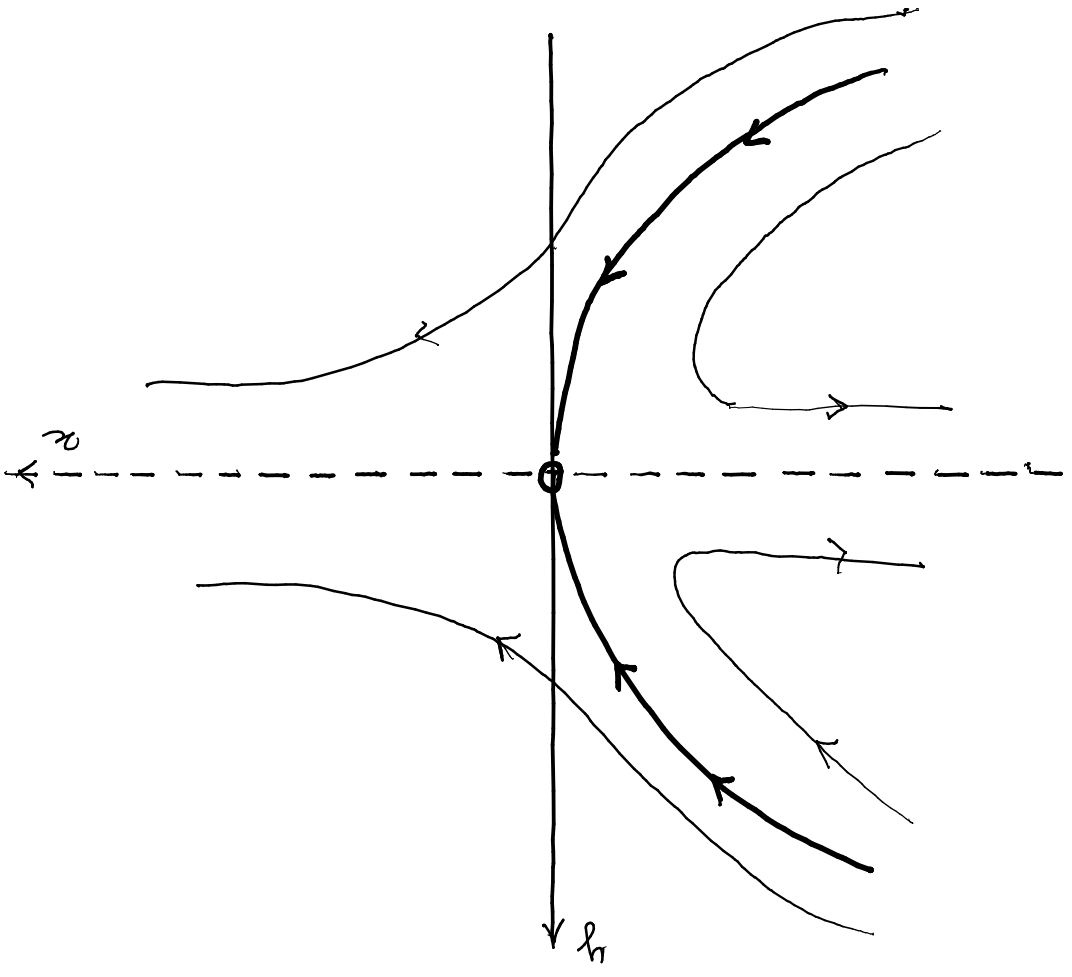
$f(x;\psi) = \psi x - x^2$

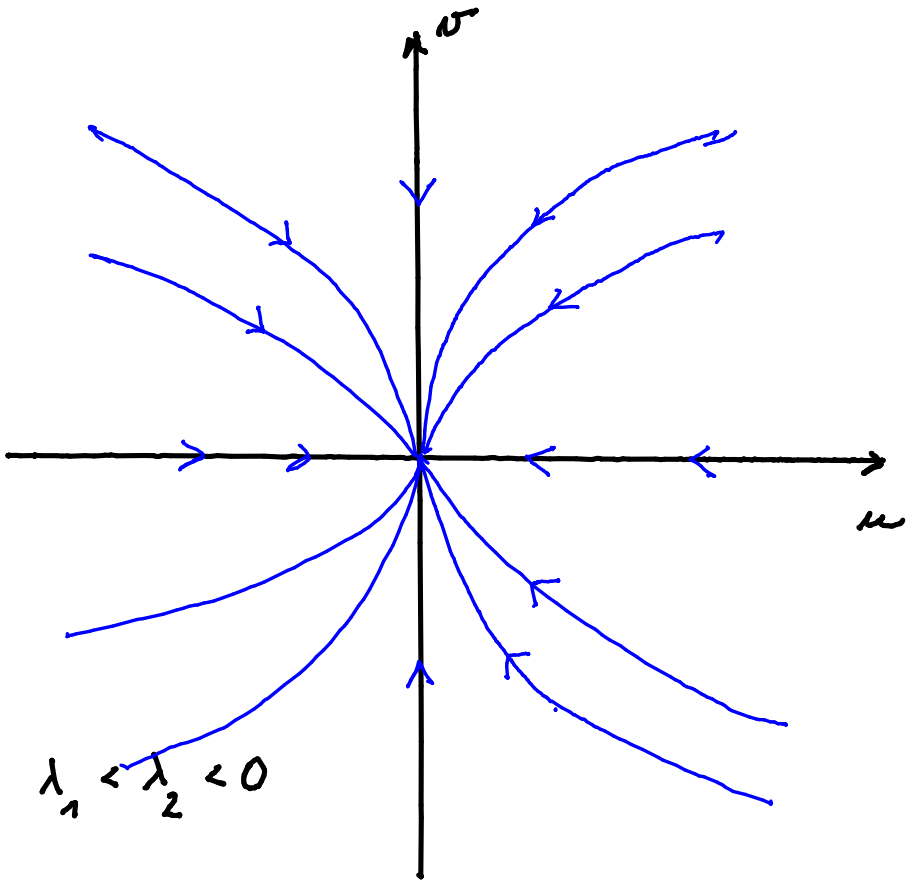


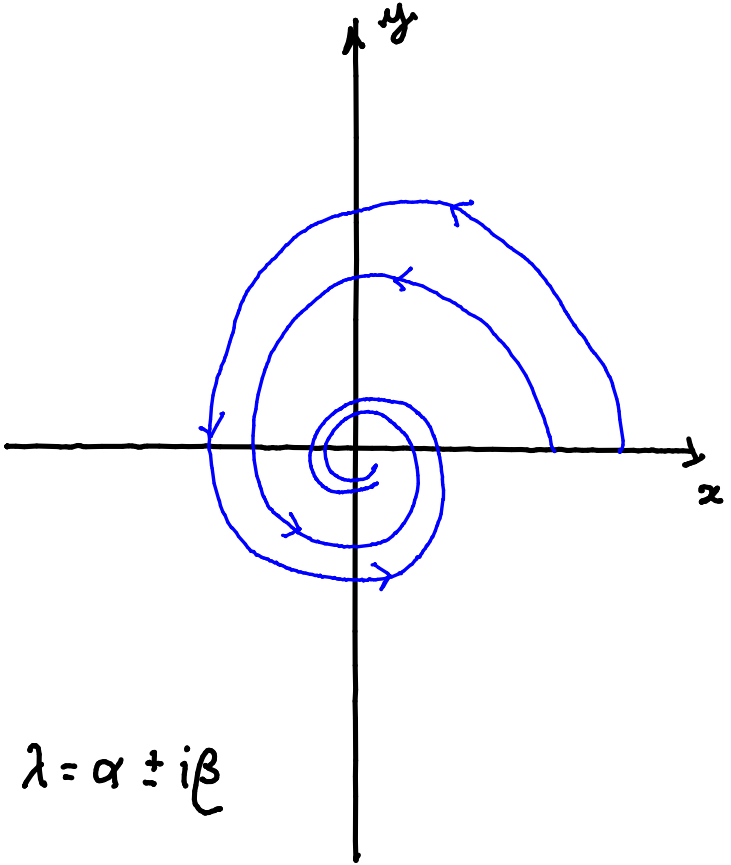
$f(x;\psi) = \psi x - x^3$


$\alpha \vec{u}$
(x_0, y_0)
$\beta \vec{v}$
y
x
x
transient growth
t


x
p

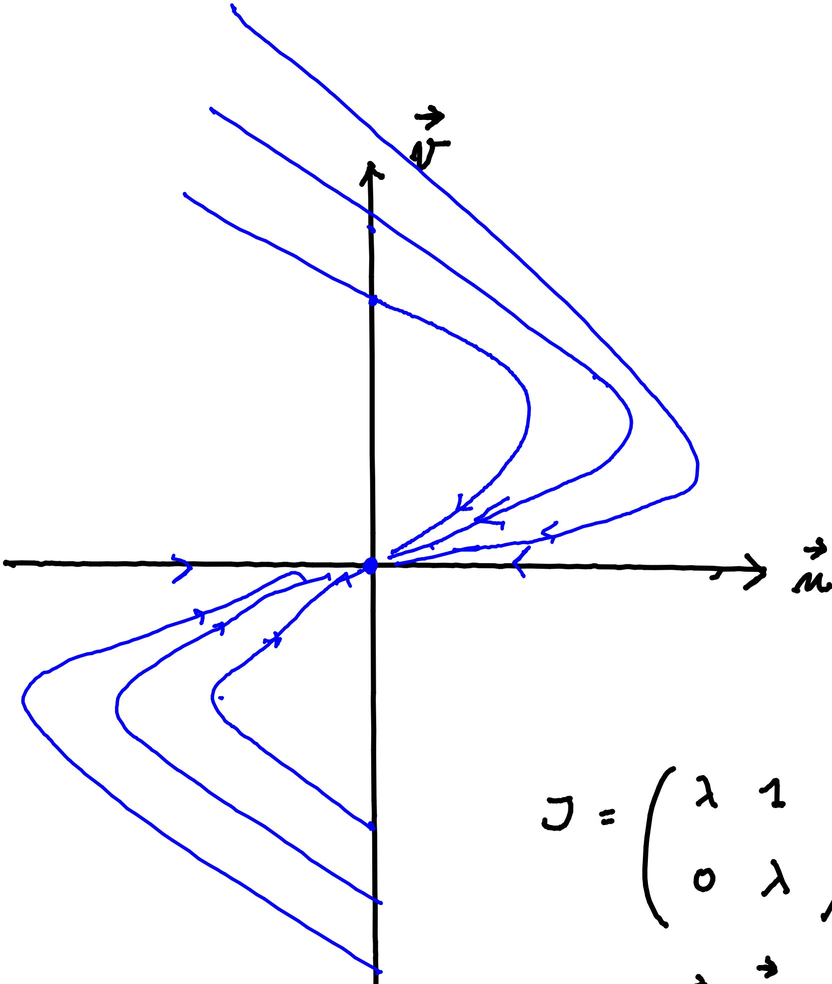

x
h


v
u
$\lambda_1 < \lambda_2 < 0$



$\lambda = \alpha \pm i\beta$

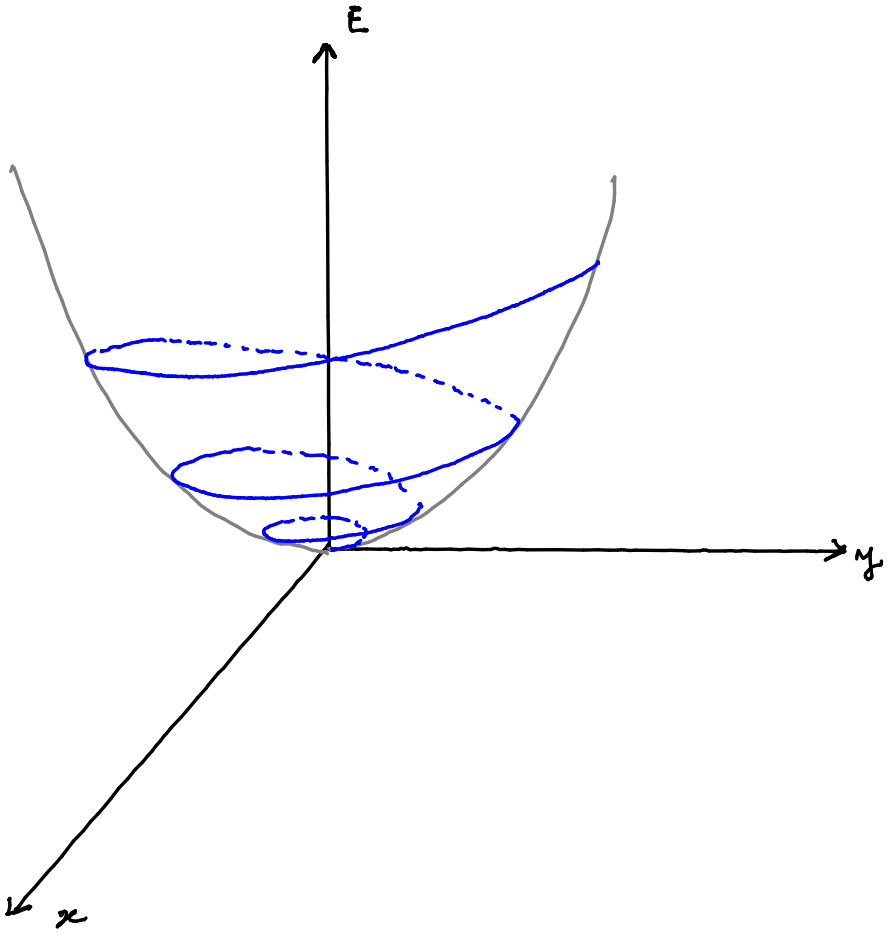
$\alpha < 0$



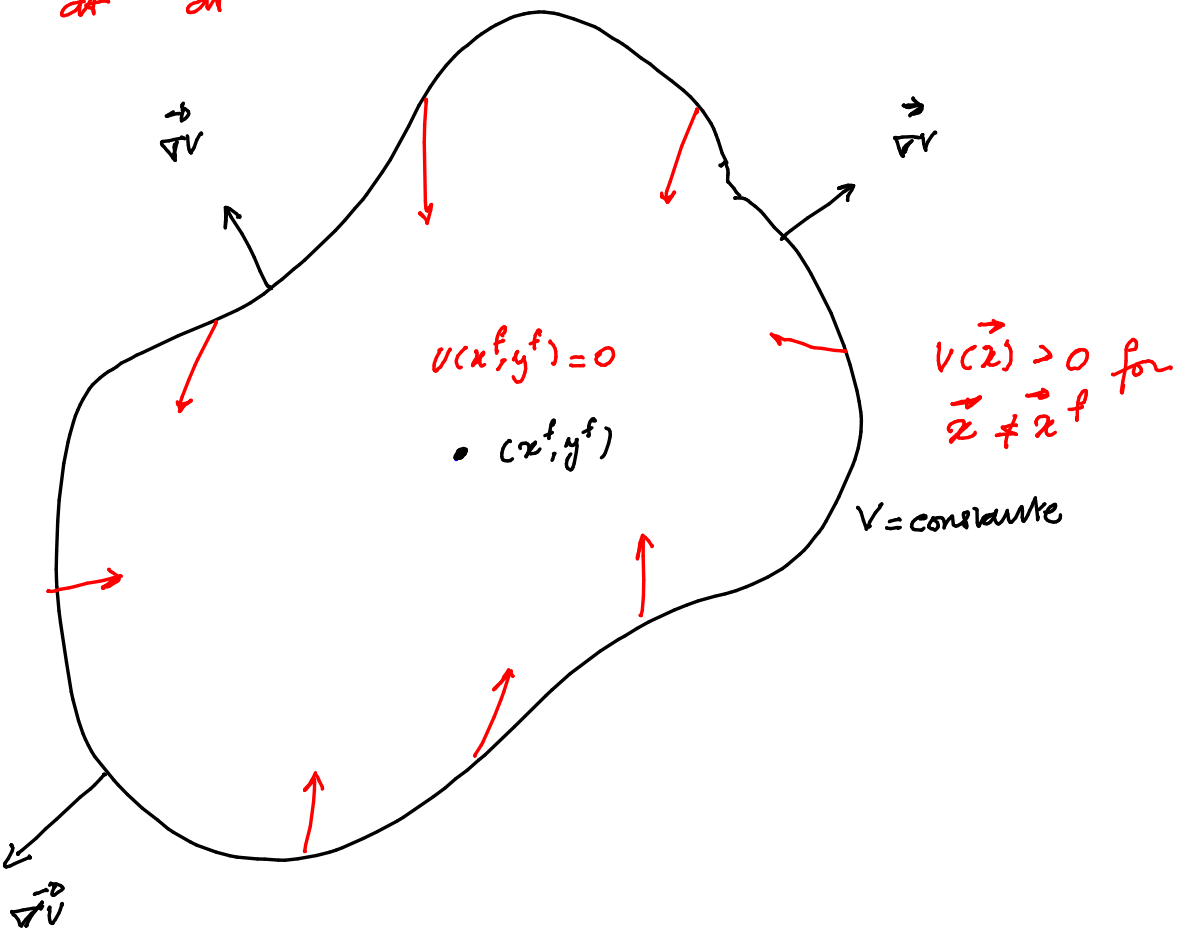
$$J = \begin{pmatrix} \lambda & 1 \\ 0 & \lambda \end{pmatrix}$$

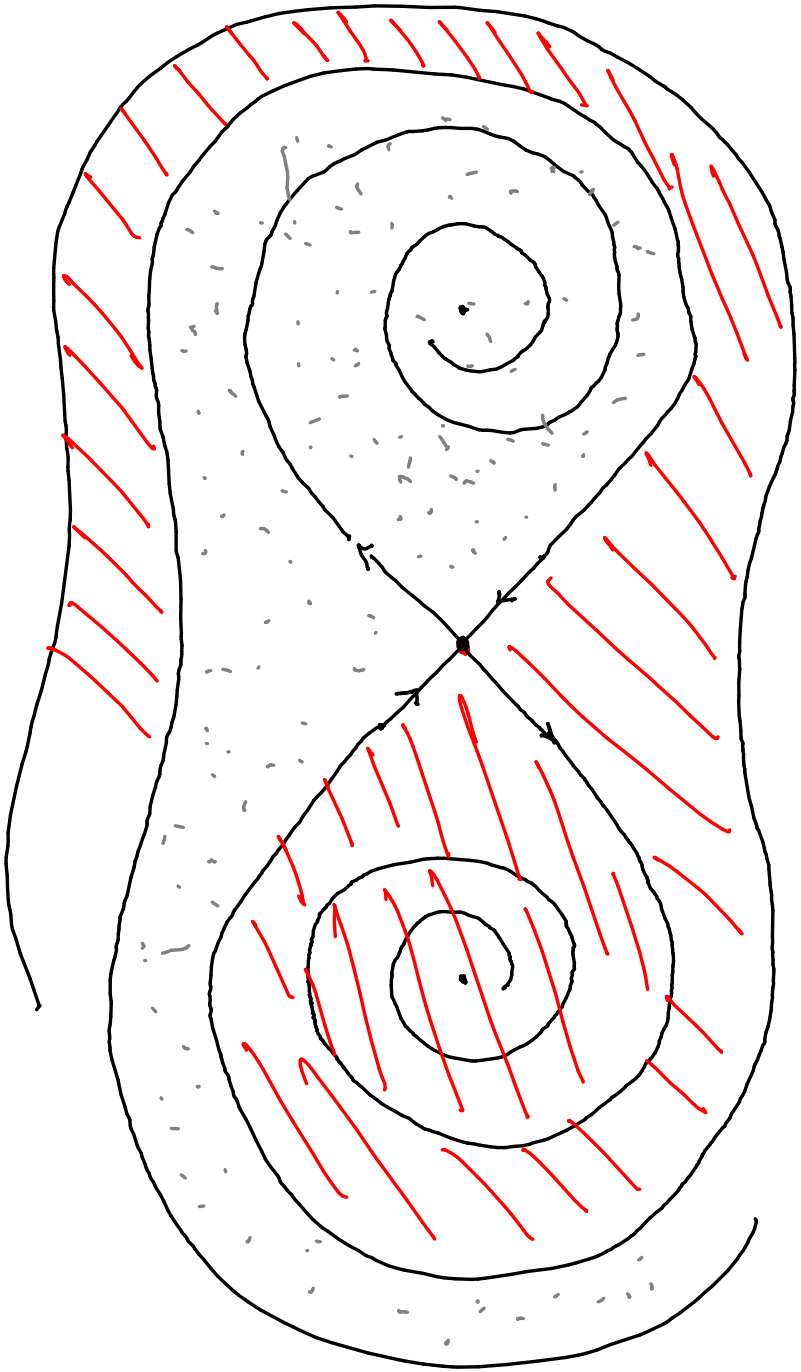
$$T = (\vec{u}, \vec{v})$$

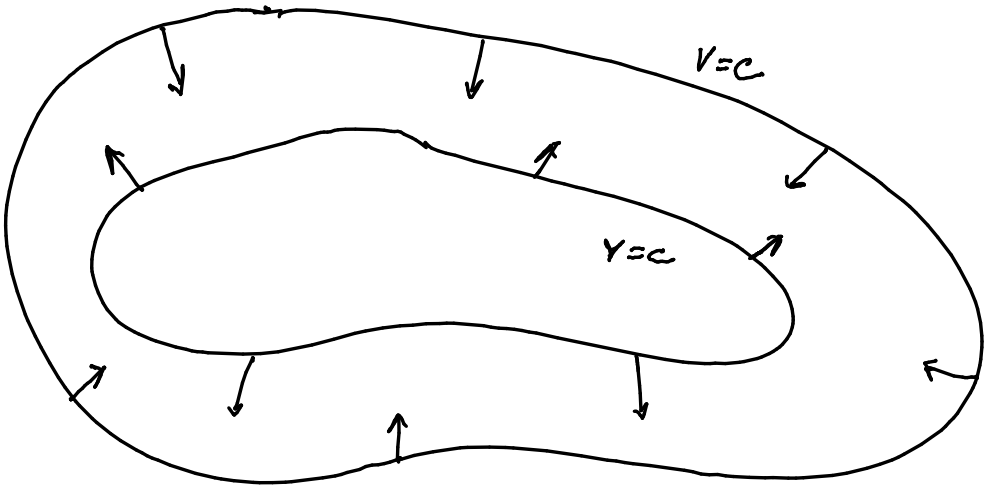
$$\lambda < 0$$

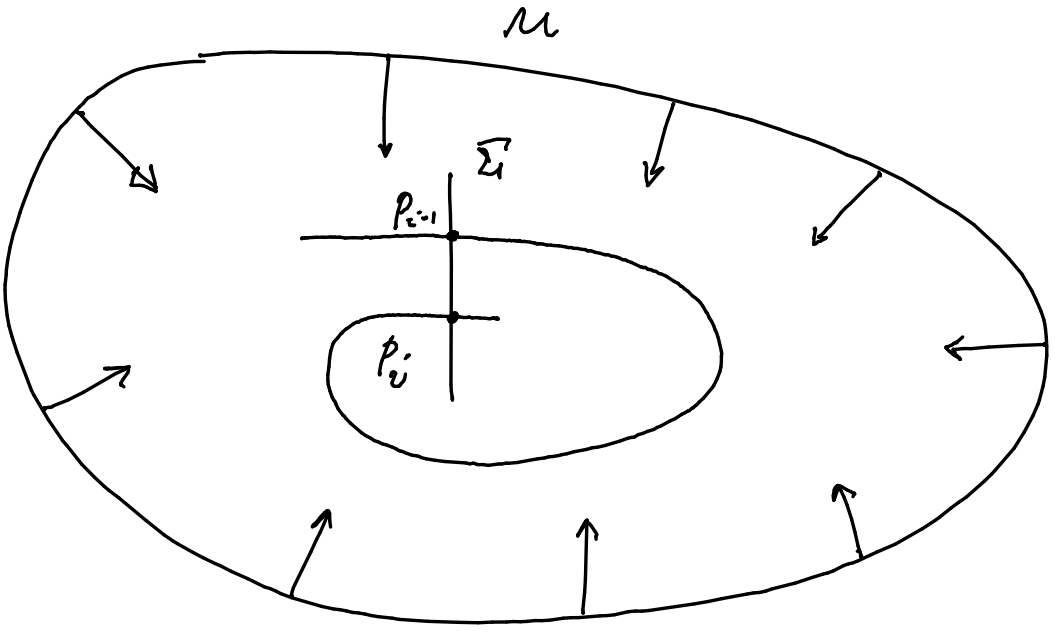

E
y
x

$$\frac{dV}{dt} = \frac{d\vec{x}}{dt} \cdot \vec{\nabla} V < 0$$






V=C
V=C


$\mathcal{M}$
Σ_i
p_{i+1}
p_i

$$\frac{dx}{dy} = \frac{-y}{x - F(y)} \qquad \dot{x} = -y \qquad \dot{y} = x - F(y)$$

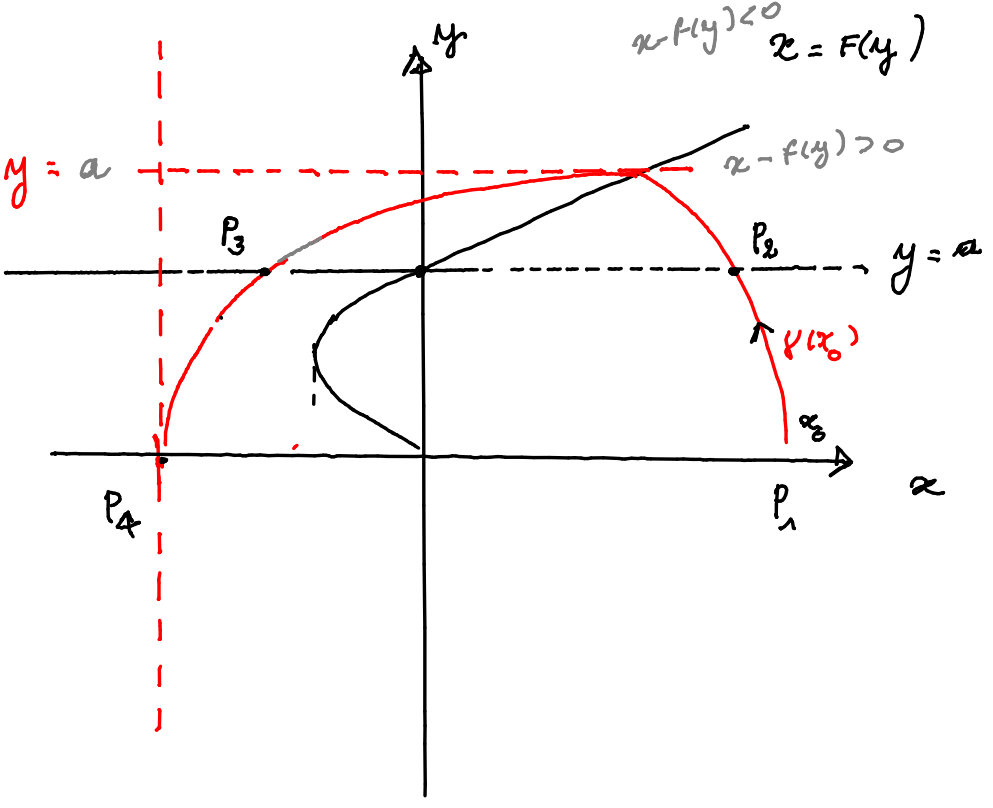
$$H = x^2 + y^2$$

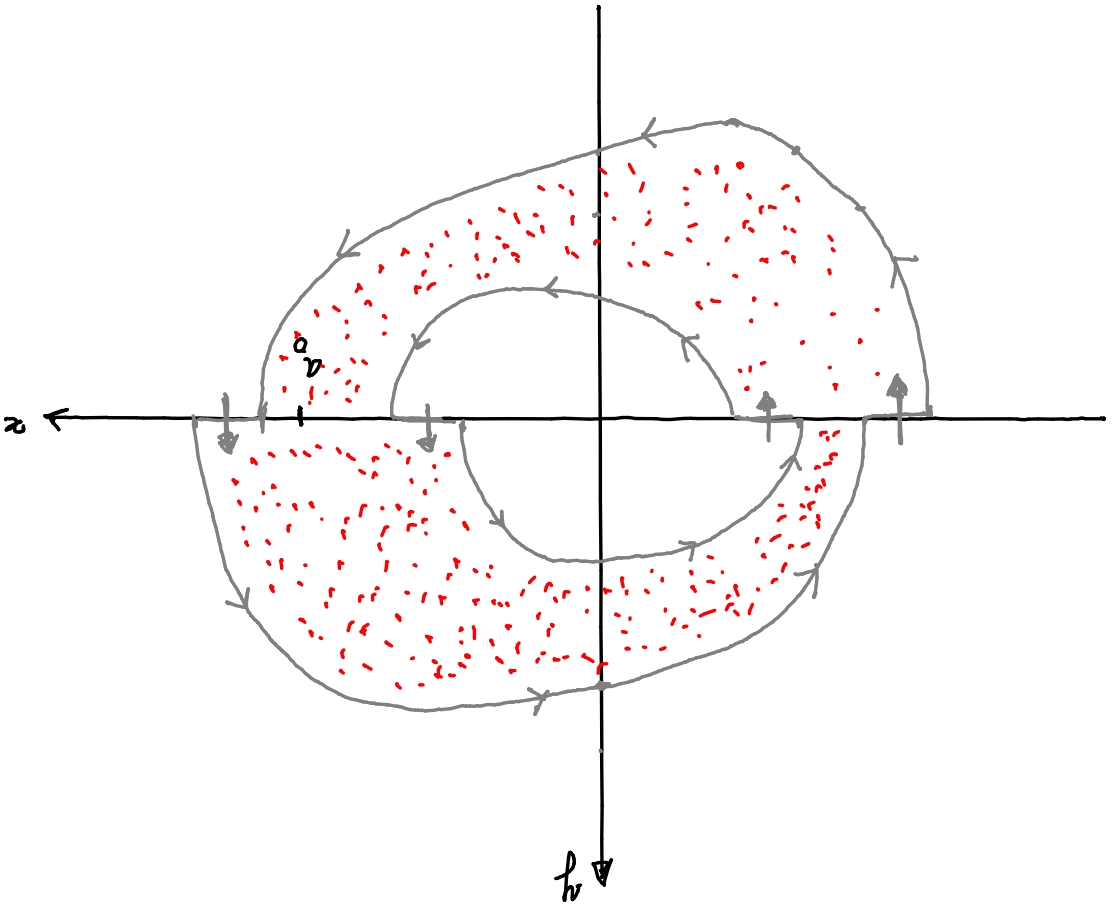
$$dH = x\,dx + y\,dy$$

$$= -xy\,dt + yx\,dt - yF(y)\,dt$$

$$\boxed{dH = dx \cdot F(y)}$$

$$\Rightarrow \quad \boxed{dH = \frac{-yF(y)}{x - f(y)} \cdot dy}$$


y
x - F(y) < 0
x = F(y)
y = a
x - F(y) > 0
P3
P2
y = a
γ(x0)
x0
P4
P1
x


a
1
h