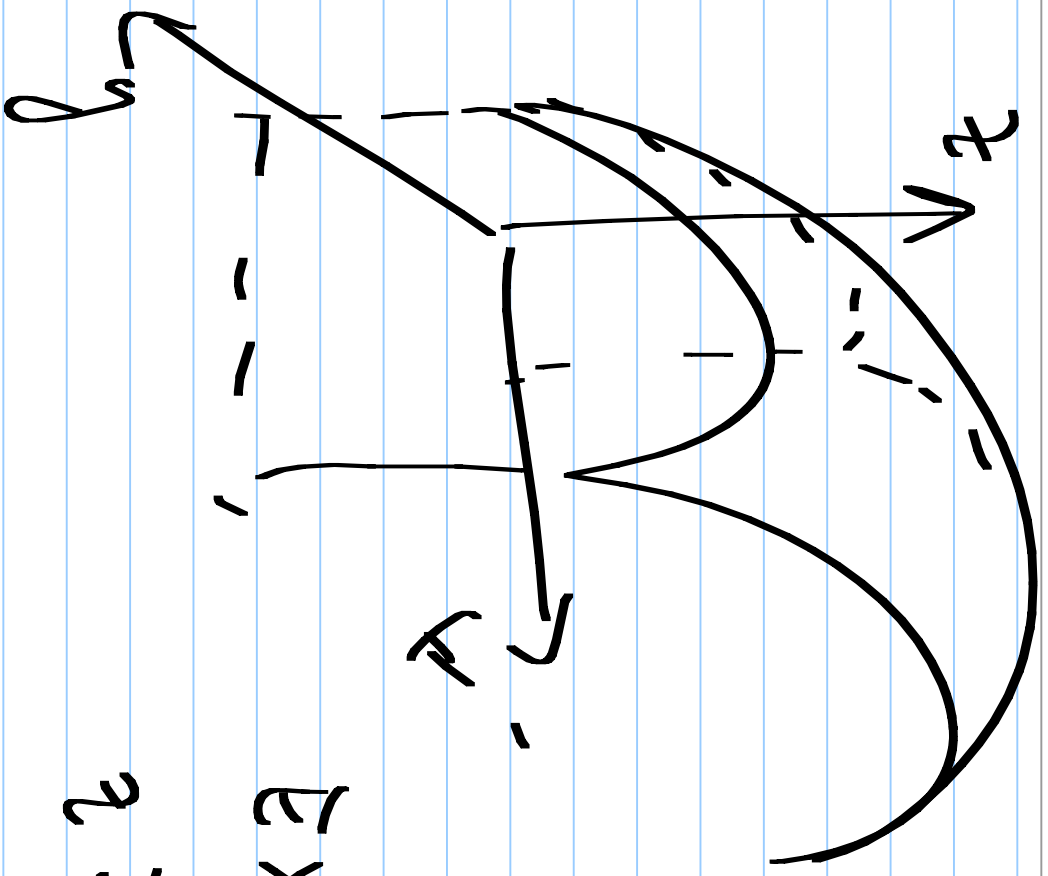


$\mathbb{R}^3 \rightarrow \mathbb{R}$

$f: \mathbb{R}^3 \rightarrow \mathbb{R}$



EXTREMY

$z = z(x, y)$

$$F(x, y, z) = (e^{x \ln y}, x y z) \quad P = [1, \pi, 1]$$

$$C(x) = (y(x), z(x)), \quad F(x, y, z) = 0, \quad \text{find } v, P?$$

$$D'F = \begin{pmatrix} \text{sing.} & e^{x \ln y} & x \ln y & x y z \\ & x \ln y & x y z & 0 \end{pmatrix}$$

$$D'F(1, \pi, 1) = \begin{pmatrix} 0 & \pi & \pi & \pi \\ -1 & 1 & 1 & 0 \end{pmatrix}$$

$$D'F = \begin{pmatrix} 0 & \pi & \pi & \pi \\ -1 & 1 & 1 & 0 \end{pmatrix} \quad \lambda = -1 \neq 0$$

$$\begin{aligned} & \parallel \\ & \Rightarrow \parallel > \parallel \\ & \Rightarrow \parallel > 0 \end{aligned}$$

$$\Rightarrow \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$\parallel \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} -1 & -1 \\ -1 & 0 \end{pmatrix} \cdot \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\Rightarrow \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$

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

$$\begin{pmatrix} -1 & -1 \\ -1 & 0 \end{pmatrix} \Rightarrow \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\Rightarrow \begin{pmatrix} 0 \\ 0 \end{pmatrix}$$



$$h(x_1, \dots, x_{n+m})$$

$$F(x_1, \dots, x_{n+m})$$

"

$$g_{r+1} h = \underbrace{h_1 g_{r+1} f_1 + \dots + h_n g_{r+1} f_n}_{f_n(\cdot, \dots)} \\ F = 0$$

$$g_{r+1} (h_1 f_1 - \dots - h_n f_n) = 0$$

$g$

$$H_g(p)$$

→ nur linear!

$$\phi \begin{cases} 0 = \sqrt{x} \\ 0 = \sqrt{y} \\ 0 = 2xy \\ 0 = x^2y \end{cases}$$

$$\underline{\underline{L(x, y, z) = 2 - xy}}$$

$$M: \nabla L(x, y, z) = \begin{pmatrix} -y \\ -x \\ 2 \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

$$h = z - xy^2$$

$$\text{grad } h = \begin{pmatrix} -y^2 \\ -2xy \\ 1 \end{pmatrix}$$

$$= \lambda \text{ grad } F = \lambda \begin{pmatrix} 2x \\ 2y \\ 2z \end{pmatrix}$$

$$\text{with: } x^2 + y^2 + z^2 - 1 = 0$$

$$-y^2 - 2xy = 0$$

$$-2xz - 2y\lambda = 0$$

$$1 - 2z\lambda = 0$$

$$x = -\lambda \quad y = \pm\sqrt{2x} \pm\sqrt{2z}$$

$$1 + 2zx = 0 \quad z = -\frac{1}{2x}$$

$$z = \frac{1}{2x}$$

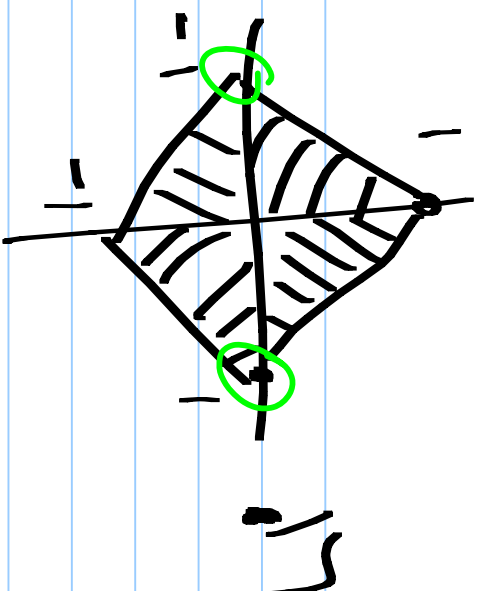
$$0 = -\lambda + \frac{1}{2x} - 1 = 0$$

$$2\lambda^2 + \frac{1}{\lambda} - \lambda^2 = 0$$

$$h(0, 0, 1) = 1$$

$$h(0, 0, -1) = -1$$

$$h: |x| + |y| \leq 1$$



$$h = x^2 - 4x + 2$$

$$= (x-2)^2 + 2 - 4$$

$$g = \sqrt{h+y} \dots \text{Wertebereich } (x,y) \in [2,0]$$

$$h = g - 4$$