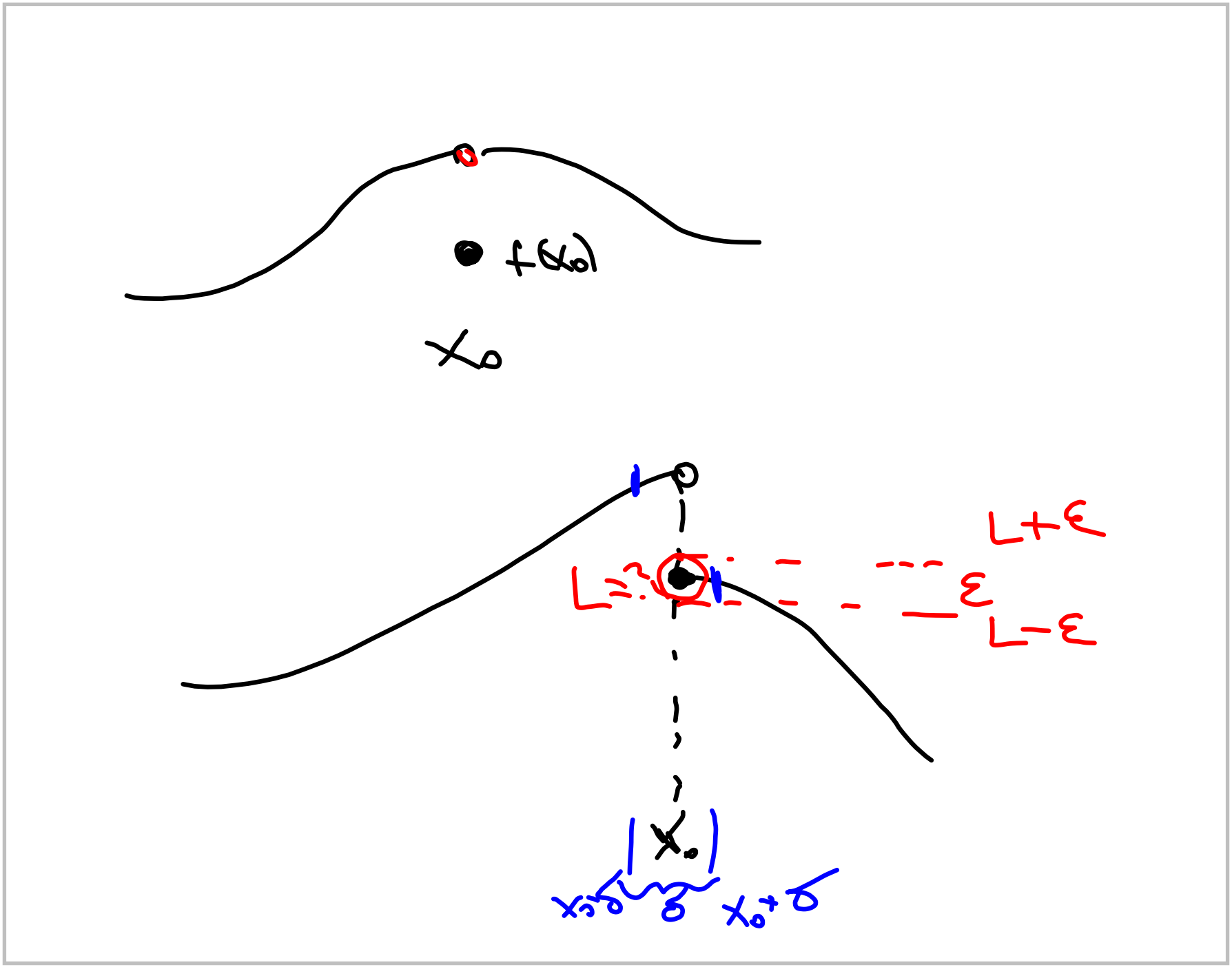
$y = f(x)$ $\qquad f : \mathbb{R} \to \mathbb{R}$

$x \longmapsto f(x)$ $\qquad \mathbb{R}^n \to \mathbb{R}$

$\lim_{x \to x_0} f(x) = L \iff$

$\forall \varepsilon > 0 \; \exists \delta > 0 : 0 < \|x - x_0\| < \delta$

$\Rightarrow |f(x) - L| < \varepsilon$


f(x0)
x0
L+ε
L
ε
L-ε
x0
x0-δ
δ
x0+δ

Určete def. obor

$$f(x,y) = \arccos(x^2+y^2-1) + \sqrt{|x|+|y|-\sqrt{2}}$$

Řeš: $z = \cos(w) \Rightarrow w = \arccos(z)$

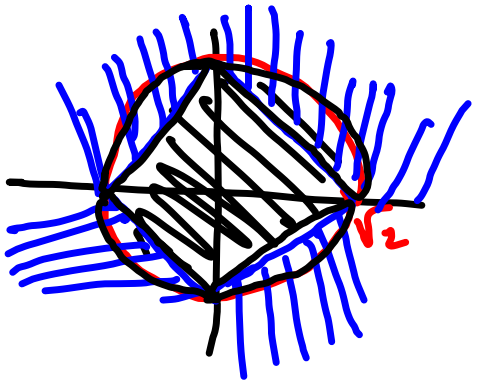
$D(\arccos) = \langle -1, 1 \rangle$

$-1 \le x^2+y^2-1 \le 1$

$0 \le x^2+y^2 \le 2$

$|x|+|y|-\sqrt{2} \ge 0$

$|x|+|y| \ge \sqrt{2}$



$$f(x,y) = \sqrt{x^2+y^2}$$

$$D(f) = \mathbb{R}^2$$

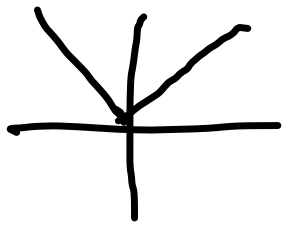
vrovně k: $f(x,y) = k$

$(k \geq 0)$ $\sqrt{x^2+y^2} = k$

$x^2+y^2 = k^2$

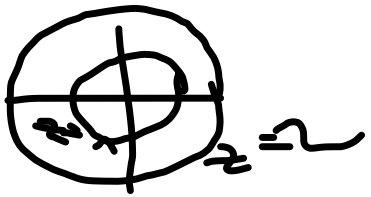
kružnice se středem v $(0,0)$ a poloměrem k

$x=0$: $f(x,y) = \sqrt{y^2} = |y|$



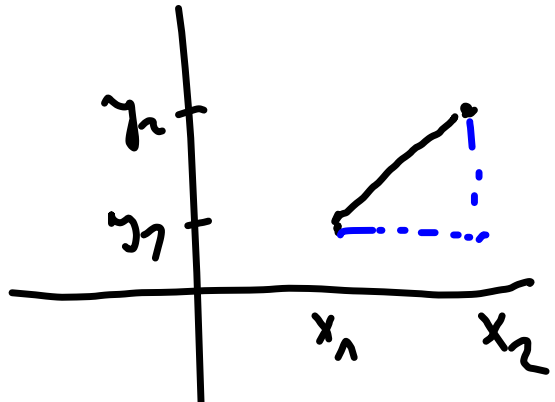
$y=0$ $f(x,y) = \sqrt{x^2} = |x|$

$z=0$ – vrovně 0



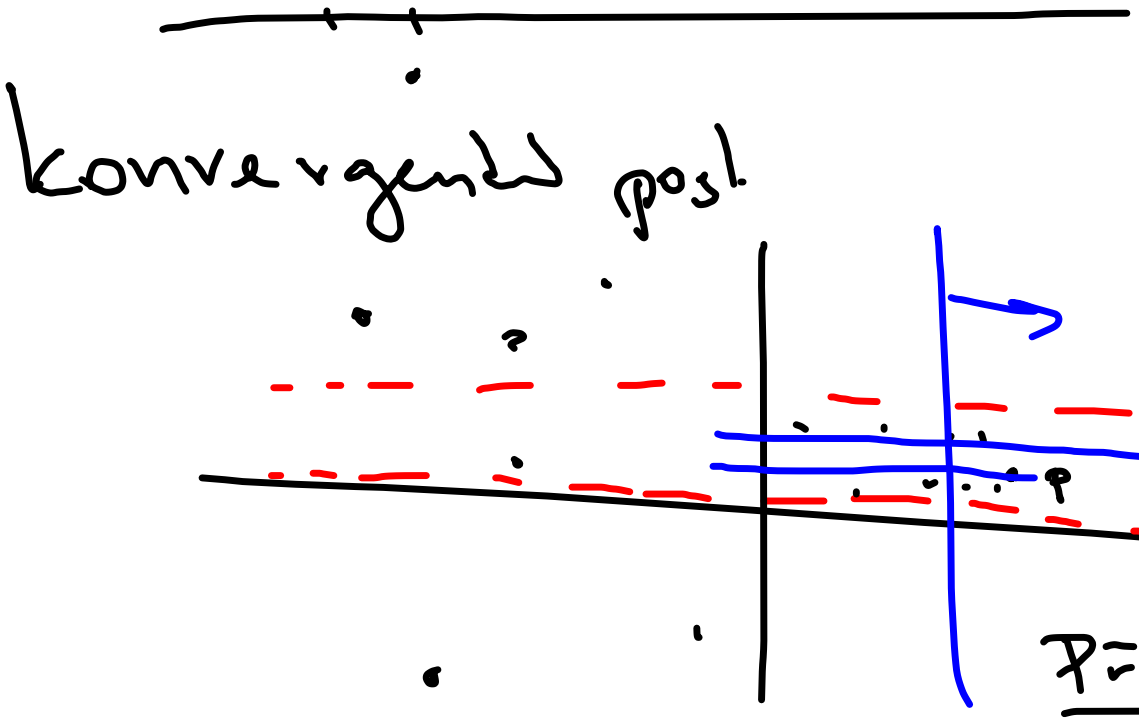
grafem je kružnice

$$\rho(x,y) = \sqrt{\sum_{i=1}^{n} (x_i - y_i)^2}$$



$$\rho(x,y) = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

Cauchyovská posl.



konvergentní posl.

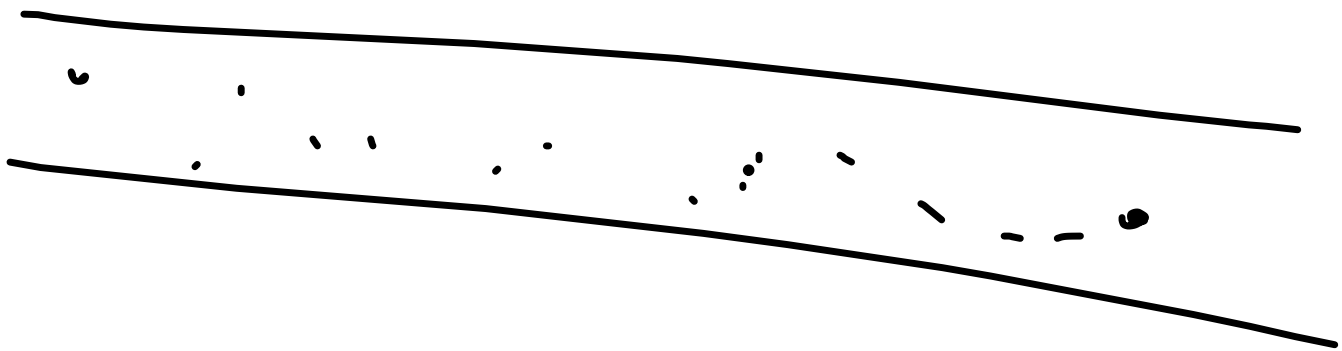
$P:\ \varepsilon = 10^{-3}$

$N = 10^4 : \left|\frac{1}{m} - \frac{1}{n}\right| < \frac{1}{10^4}$

$m,n > N$

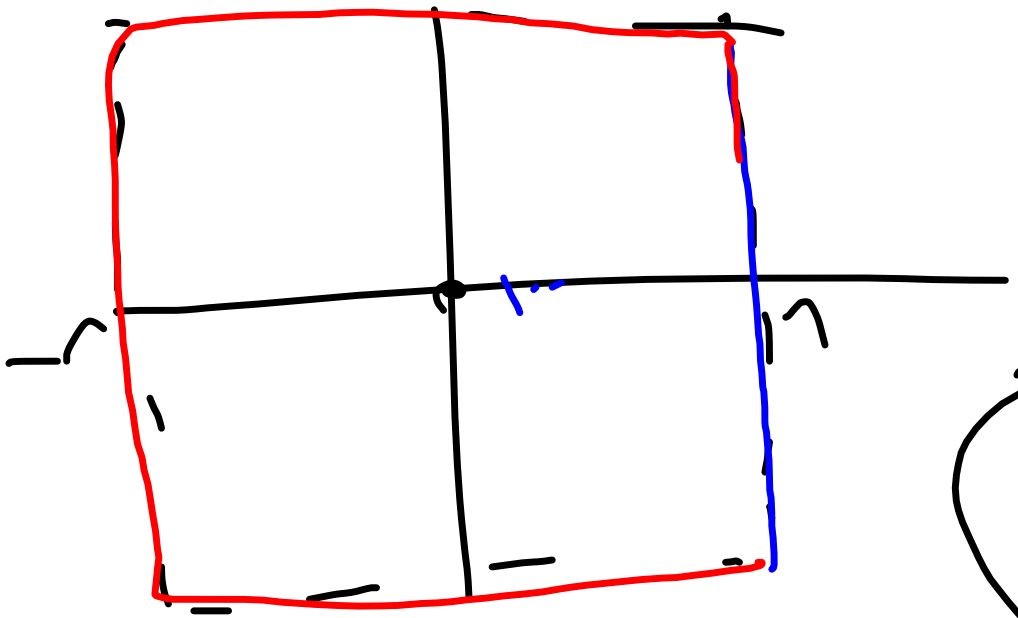
konvergentní $\Rightarrow$ Cauchy

$\not\Leftarrow$ $\mathbb{R}^+$ $\{\frac{1}{n};\ n \in \mathbb{N}\}$



limita $\Rightarrow$ jedný hromadný bod

$\{(-1)^n ; n \in \mathbb{N}\}$



$|x| \leq 1$

$|y| \leq 1$

uzavřené

$|x| < 1$

$|y| < 1$

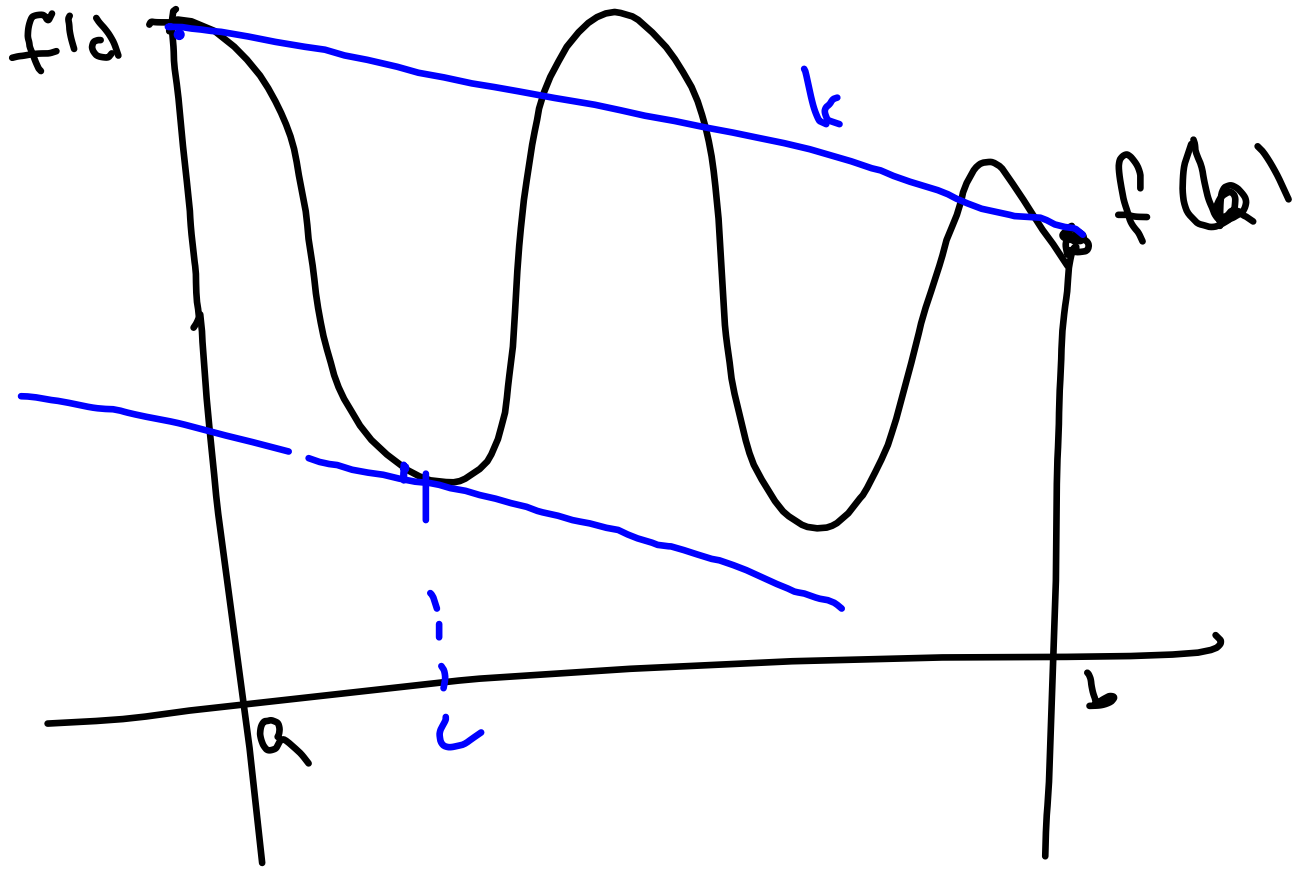
otevřené

$-1 \leq x < 1$

$-1 \leq y \leq 1$

$\forall \delta \, \exists \gamma : chodí(\delta, \gamma)$

$\exists \delta \, \forall \gamma : chodí(\delta, \gamma)$



$$k = \frac{f(b)-f(a)}{b-a}$$

$$\exists\, c \in [a,b]:\ f'(c) = k$$