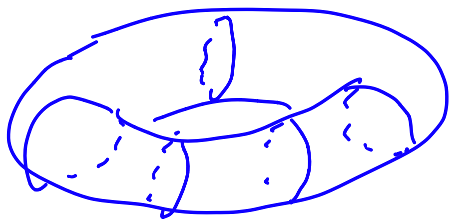
$\mathbb{R}^n$ is a metric space
(implicitly choosing the Euclidean norm)

2-Torus



function space $C([0,1],\mathbb{R})$

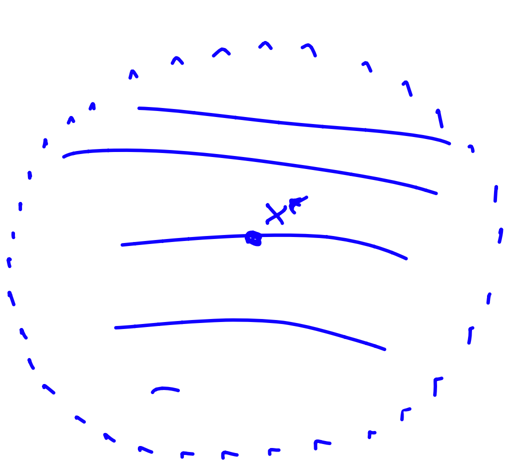
space of continuous functions

$f:[0,1]\to\mathbb{R}$

X

$$\rho(f,g) \equiv \max_{x\in[0,1]} |f(x)-g(x)|$$

ρ



$\{x \mid \rho(x, x^*) < 3\}$

$(x^2 - 1) = (x+1)(x-1)$

calculus on polynomials

cryptography

$25 = 5^2$

"Range" David Epstein

$a \leq \xi$

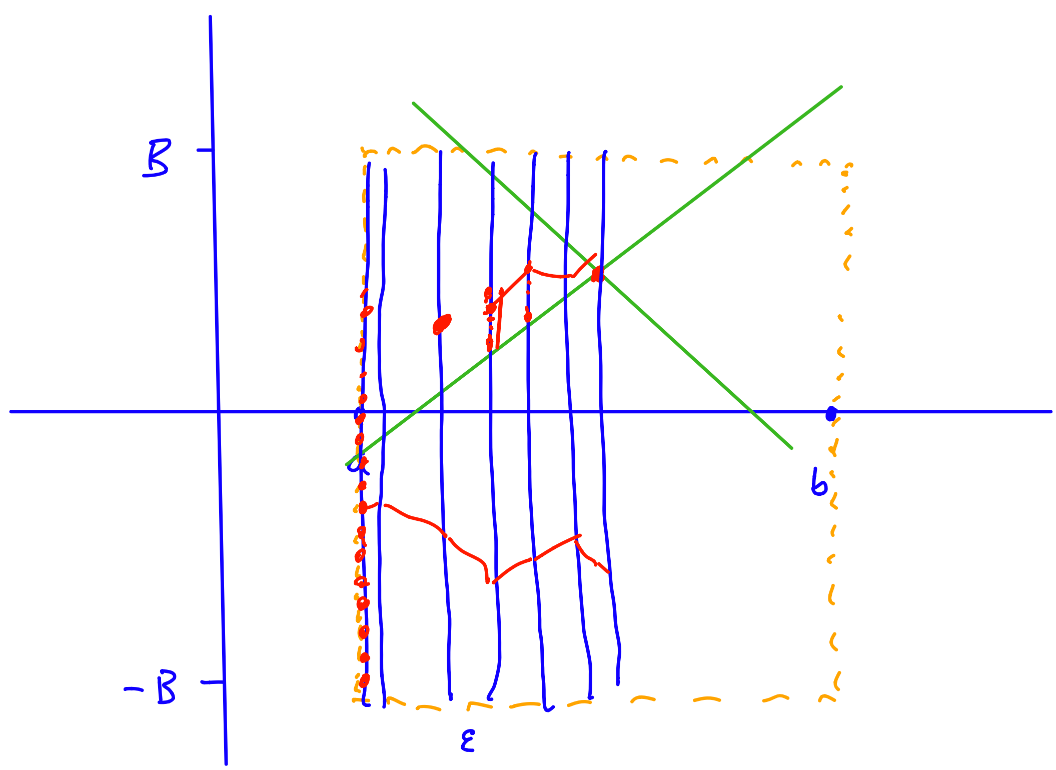
$\leq \xi$

$\leq \xi$

---

notes on Ex 4, 7, 15

Lip([a,b], K, B)



$$\frac{B}{\varepsilon} \qquad \frac{2K\varepsilon}{\varepsilon} = 2K$$

$$\left(\frac{B}{\varepsilon}\right) \underset{1}{(2K)} \underset{2}{(2K)} \underset{3}{(2K)} \ldots \underset{\frac{b-a}{\varepsilon}}{(2K)}$$

$$\left(\frac{B}{\varepsilon}\right) (2K)^{\left(\frac{b-a}{\varepsilon}\right)}$$

$$\left\lceil\frac{B}{\varepsilon}\right\rceil \lceil 2K \rceil^{\left\lceil\frac{b-a}{\varepsilon}\right\rceil}$$

If

Lipschitz reminder

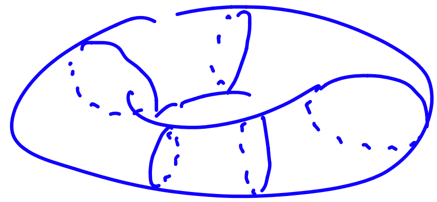
$$|f(x) - f(y)| < K|x - y|$$

for $K < \infty$ $\forall$ x, y in domain

f is said to be Lipschitz Continuous

Uses of Lipschitz functions/mappings

manifold



Rectifiable sets generalize and they are defined using Lipschitz mappings

$$\dot{x} = f(x) \quad \text{autonomous}$$

proving existence and uniqueness for differential Equations

$$\dot{x} = f(x, t) \quad \text{non-autonomous}$$

→ Picard-Lindeloff

uses Lipschitz condition on the R.H.S. (right hand side) f.

→ Peano

another existence theorem that does not use Lipschitz ... but you do not get uniqueness!