Why

What is the natural generalization of a smooth function to functions defined on sets of $\mathbf{R}^k$.[1]

Definition

Let $U \subset \mathbf{R}^d$ be an open set (see Real Open Sets). A function $f : U \to \mathbf{R}$ is *smooth* if all its partial derivatives exists and are continuous. More

More generally, let $X \subset \mathbf{R}^d$. A function $f : X \to R$ is *smooth* if there exists an open set $U \subset \mathbf{R}^d$ and a smooth $F : U \to \mathbf{R}$ so that $F(x) = f(x)$ for all $x \in U \cap X$.

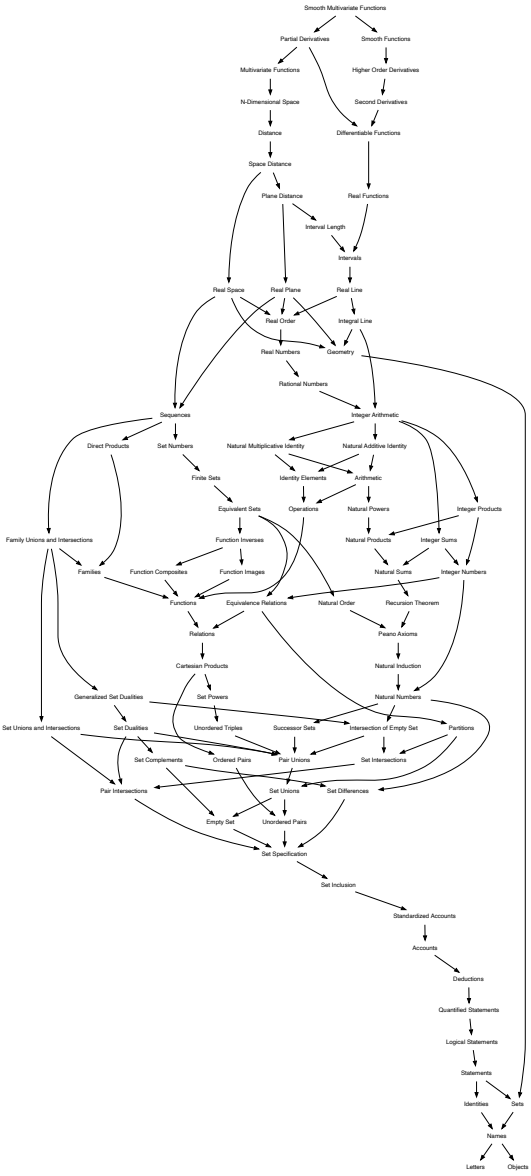
Example

The identity map is smooth. In other words, let $f : \mathbf{R}^d \to \mathbf{R}$ be so that $X \subset \mathbf{R}^d$. Then $f : X \to \mathbf{R}$ s

Properties

Proposition 1. *The composition of two smooth functions is smooth.*

[1] Future editions will expand.


Smooth Multivariate Functions
Partial Derivatives
Smooth Functions
Multivariate Functions
Higher Order Derivatives
N-Dimensional Space
Second Derivatives
Distance
Differentiable Functions
Space Distance
Plane Distance
Real Functions
Interval Length
Intervals
Real Space
Real Plane
Real Line
Real Order
Integral Line
Real Numbers
Geometry
Rational Numbers
Sequences
Integer Arithmetic
Direct Products
Set Numbers
Natural Multiplicative Identity
Natural Additive Identity
Finite Sets
Identity Elements
Arithmetic
Equivalent Sets
Operations
Natural Powers
Integer Products
Family Unions and Intersections
Function Inverses
Natural Products
Integer Sums
Function Compositions
Function Images
Natural Sums
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Families
Functions
Equivalence Relations
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Recursion Theorem
Relations
Peano Axioms
Cartesian Products
Natural Induction
Generalized Set Dualities
Set Powers
Natural Numbers
Set Unions and Intersections
Set Dualities
Unordered Triples
Successor Sets
Intersection of Empty Set
Partitions
Set Complements
Ordered Pairs
Pair Unions
Set Intersections
Pair Intersections
Set Unions
Set Differences
Empty Set
Unordered Pairs
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects