Why

We try to precisely characterize the idea that a function is continuous, or uninterrupted.

Definition

Consider a function from the real numbers to the real numbers.

The function is *continuous at a point* in its domain if for every positive real number, there is a positive real number such that every pointin the domain which is the second positive number close to the first element has result which is the first positive number close to the second.

A function is *continuous* if it is continuous at every point of its domain.

Notation

Let R denote the set of real numbers. Let $f : R \to R$. Then f is continuous at $x \in R$ if

$$(\forall \varepsilon > 0)(\exists \delta > 0)(|x - y| < \delta \longrightarrow |f(x) - f(y)| < \varepsilon)$$

for all $y \in R$.

Then f is continuous.

$$(\forall x \in R)(\forall \varepsilon > 0)(\exists \delta > 0)(|x - y| < \delta \longrightarrow |f(x) - f(y)| < \varepsilon)$$

for all $y \in R$.

Real Continuity

Absolute Value

Interval Length

Intervals

Real Line

Real Order

Rational Order

Real Numbers

Rational Numbers

Integral Line

Integer Arithmetic

Integer Products

Natural Multiplicative Identity

Natural Additive Identity

Identity Elements

Arithmetic

Natural Powers

Comparisons

Integer Order

Integer Sums

Natural Products

Operations

Orders

Integer Numbers

Natural Sums

Converse Relations

Equivalence Relations

Natural Order

Functions

Recursion Theorem

Relations

Peano Axioms

Set Products

Natural Induction

Ordered Pairs

Set Powers

Natural Numbers

Partitions

Unordered Triples

Successor Sets

Intersection of Empty Set

Pair Unions

Set Intersections

Set Symmetric Differences

Set Unions

Set Complements

Pair Intersections

Unordered Pairs

Set Differences

Empty Set

Geometry

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets

Identities

Names

Letters

Objects