Why

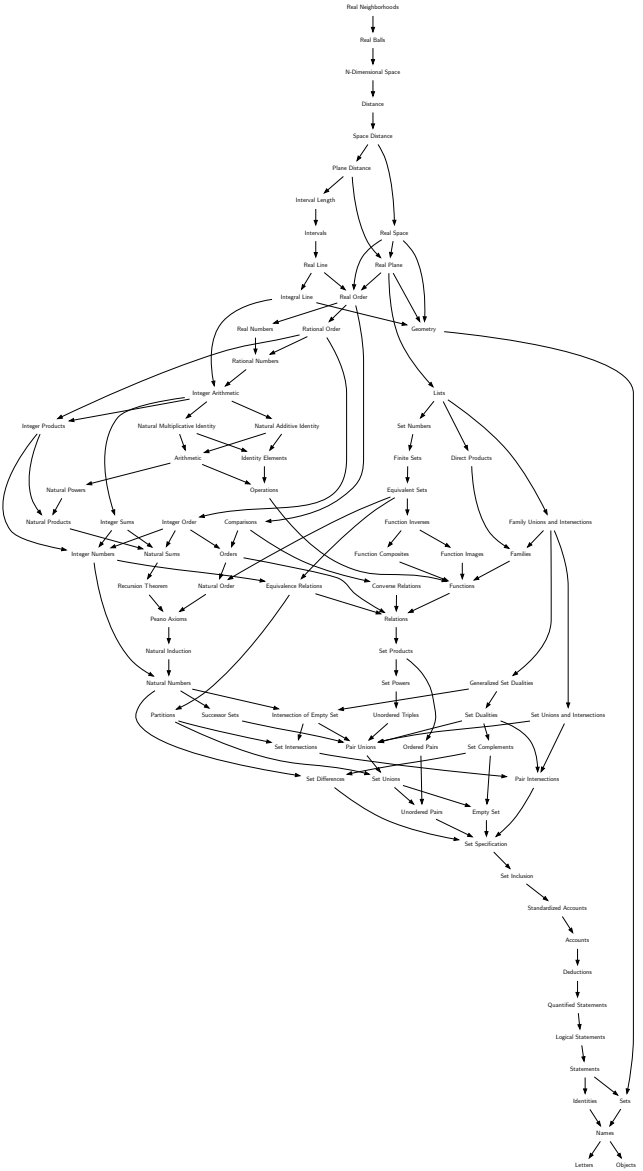
Often when speaking of a set, we are interested in speaking of those elements which are close to it.

Definition

Let $x \in \mathbf{R}^d$ A subset $N \subset \mathbf{R}^d$ is a *neighborhood of* x if there is a $\delta > 0$ such that $B(x, \delta) \subset N$. The set $\mathcal{N}_a$ of neighboords of x is called the *complete system of neighborhoods* of the point a.

We interpret a neighborhood of a point $x \in X$ as a set containing all the points of X that are sufficiently close to a. A neighborhood of x "encloses" x by virtue of it containing an open ball about a.[1]

[1]Future editions will continue to treatment, including pointing out that an open ball at x is a neighborhood of x *and* of all elements in the ball.


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