Why

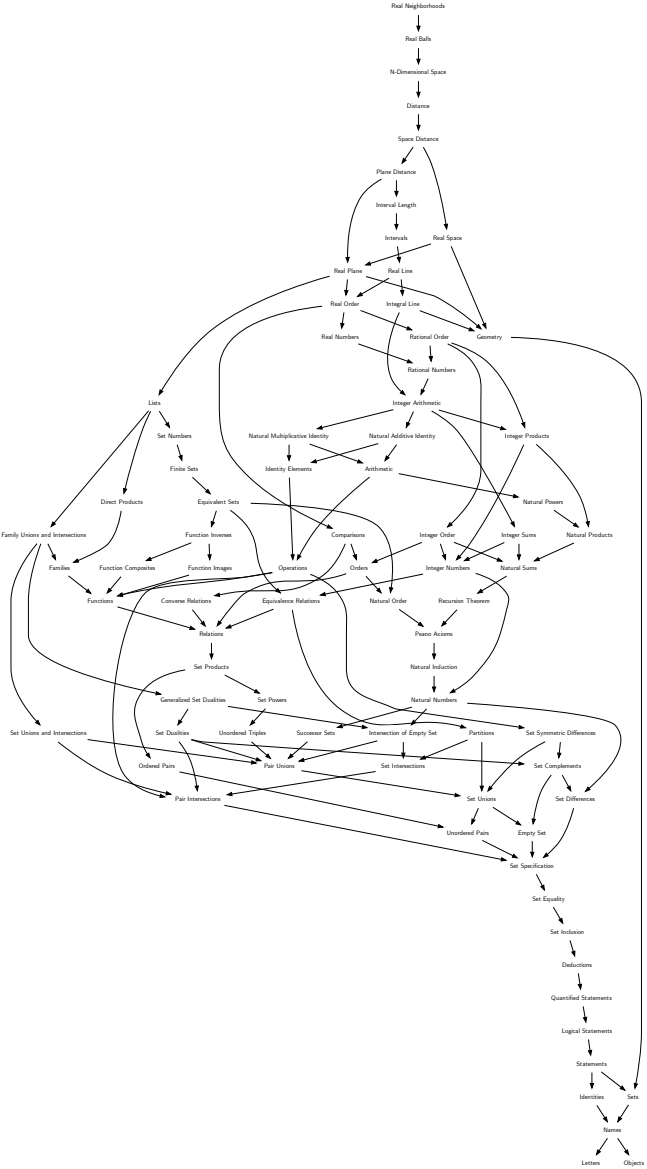
Often when speaking of a set, we are interested in speaking of those elements which are close to it.

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 Space
Real Plane
Real Line
Real Order
Integral Line
Real Numbers
Rational Order
Geometry
Rational Numbers
Integer Arithmetic
Lists
Set Numbers
Natural Multiplicative Identity
Natural Additive Identity
Integer Products
Finite Sets
Identity Elements
Arithmetic
Direct Products
Equivalent Sets
Natural Powers
Family Unions and Intersections
Function Inverses
Comparisons
Integer Order
Integer Sums
Natural Products
Families
Function Composites
Function Images
Operations
Orders
Integer Numbers
Natural Sums
Functions
Converse Relations
Equivalence Relations
Natural Order
Recursion Theorem
Relations
Peano Axioms
Set 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 Symmetric Differences
Ordered Pairs
Pair Unions
Set Intersections
Set Complements
Pair Intersections
Set Unions
Set Differences
Unordered Pairs
Empty Set
Set Specification
Set Equality
Set Inclusion
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects