Definition

Given two distinct points $x \neq y$ in $\mathbf{R}^n$, the *line* through x and y is the set of points expressable as the sum of x and $\alpha(y - x)$ where $\alpha \in \mathbf{R}$.

In other words, the line through x and y is

$$\{z \in \mathbf{R}^n \mid \exists \alpha \in \mathbf{R}, z = x + \alpha(y - x)\}.$$

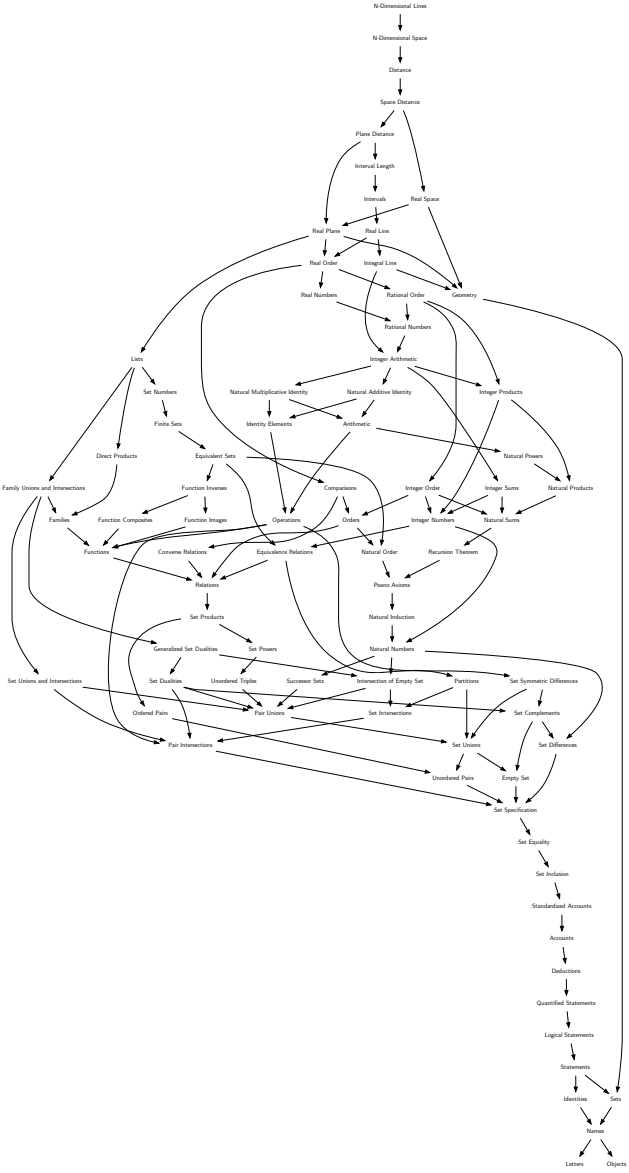
Notice that if $z = x + \alpha(x - y)$, then

$$z = (1 - \alpha)x + \alpha y,$$

where $\alpha \in \mathbf{R}$ and $x, y \in \mathbf{R}^n$.

Notation

We denote the line through x and y by $L(x, y)$.


N-Dimensional Lines
N-Dimensional Space
Distance
Space Distance
Plane Distance
Interval Length
Intervals
Real Space
Real Plane
Real Line
Real Order
Integral Line
Geometry
Real Numbers
Rational Order
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
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects