Why

We generalize real polyhedra to aribtrary inner product spaces.

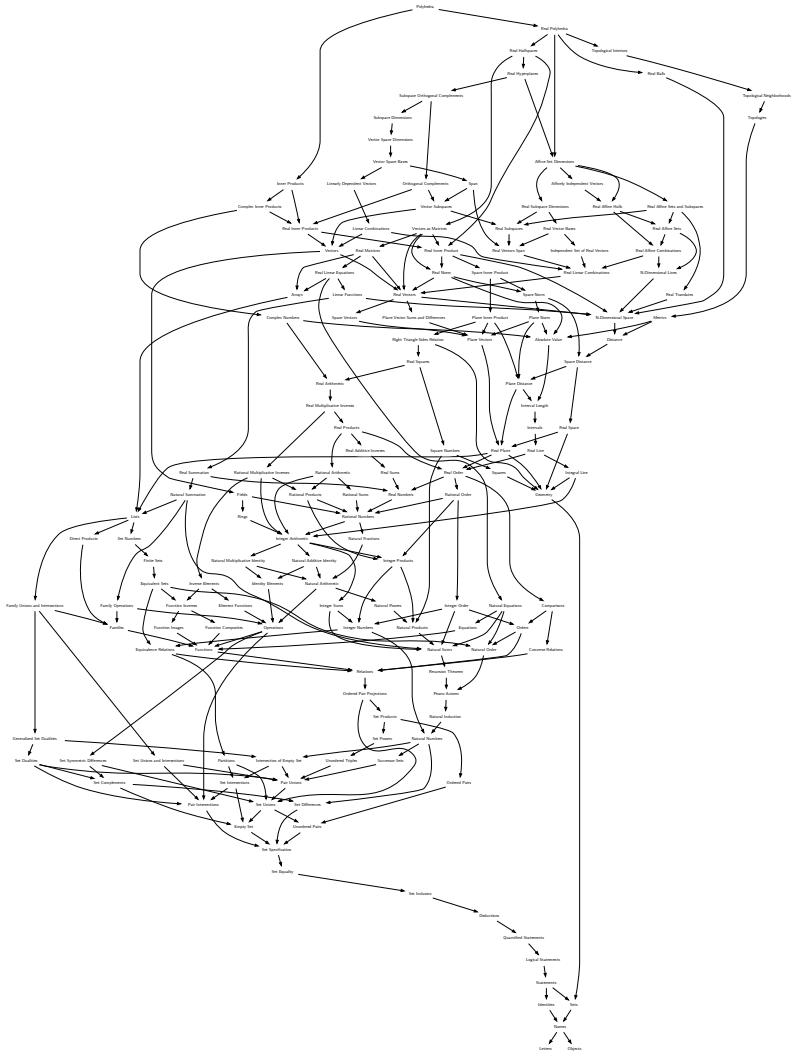
Definition

Suppose X is a vector space with an inner product $\langle \cdot, \cdot \rangle$ over $\mathbf{R}$. A set $P \subset X$ is a *polyhedron* (called a *polyhedral set*) if there exists $c_1, \ldots, c_m \in X$ and $\alpha_1, \ldots, \alpha_m \in \mathbf{R}$ so that

$$P = \{x \in X \mid \langle x, c_i \rangle \leq \alpha_i \text{ for } i = 1, \ldots, m\}$$

In other words, if the set can be described by finitely many inequalities.

As before, a polyhedron is a *polytope* if it is bounded.


Polyhedra
Real Polyhedra
Topological Interior
Real Half-spaces
Real Hyperplanes
Real Balls
Topological Neighborhoods
Subspace Orthogonal Complements
Topologies
Subspace Dimension
Vector Space Dimension
Vector Space Basis
Affine Set Dimension
Inner Products
Linearly Dependent Vectors
Orthogonal Complements
Span
Affinely Independent Vectors
Complex Inner Products
Vector Subspace
Real Subspace Dimension
Real Affine Hulls
Real Affine Sets and Subspaces
Real Inner Products
Linear Combinations
Vectors as Matrices
Real Subspace
Real Unit Norm Vectors
Real Affine Sets
Vectors
Real Matrices
Real Inner Product
Real Vectors Unit
Independent Set of Real Vectors
Real Affine Combinations
Real Linear Combinations
N-Dimensional Line
Real Equations
Real Norm
Square Norm Polynomial
Real Translation
Sums
Group Functions
Real Metrics
Space Norm
Complex Numbers
Space Metrics
Plane Vector Sums and Differences
Plane Inner Product
Plane Norm
N-Dimensional Space
Metrics
Right Triangle Sum Relation
Plane Metrics
Absolute Norm
Distance
Real Squares
Space Distance
Real Addition
Plane Distance
Real Multiplication Inverses
Interval Length
Real Products
Intervals
Real Space
Real Addition Inverses
Square Roots
Real Plane
Real Line
Real Summations
Natural Multiplication Inverses
Natural Arithmetic
Real Sums
Real Odd
Squares
Integral Line
Natural Summations
Fields
Natural Sums
Real Numbers
Natural Order
Natural Numbers
Rings
Integer Addition
Natural Numbers
Integer Products
Direct Products
Set Numbers
Finite Sets
Natural Multiplication Identity
Natural Addition Identity
Equivalent Sets
Inverse Elements
Identity Elements
Natural Arithmetic
Family Unions and Intersections
Family Operations
Function Sections
Element Functions
Integer Sums
Natural Powers
Integer Order
Natural Equations
Comparisons
Families
Function Images
Function Composition
Operations
Integer Numbers
Natural Products
Equations
Orders
Equivalence Relations
Partitions
Equivalence Classes
Natural Sums
Converse Relations
Relations
Recursive Theorems
Ordered Pair Projections
Peano Axioms
Natural Induction
Set Products
Generalized Set Unions
Set Power
Natural Numbers
Set Unions
Set Symmetric Differences
Set Unions and Intersections
Partitions
Intersection of Empty Set
Unordered Triples
Intersection Sets
Set Complements
Set Intersections
Pair Unions
Ordered Pairs
Pair Intersections
Set Unions
Set Differences
Empty Set
Unordered Pairs
Set Specialization
Set Equality
Set Inclusion
Deduction
Quantified Statements
Logical Statements
Statements
Identities
Sets
Terms
Letters
Objects