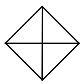


Definition

A set $C \subset \mathbf{R}^n$ is *convex* if it contains the closed line segment between every pair of distinct points. In other words,

$$\lambda x + (1-\lambda)y \in C \quad \text{for all } x, y \in C \text{ and } \lambda \in [0,1].$$

Roughly speaking, C is convex if and only if its intersection with every line in $\mathbf{R}^n$ is either empty or a closed line segment.

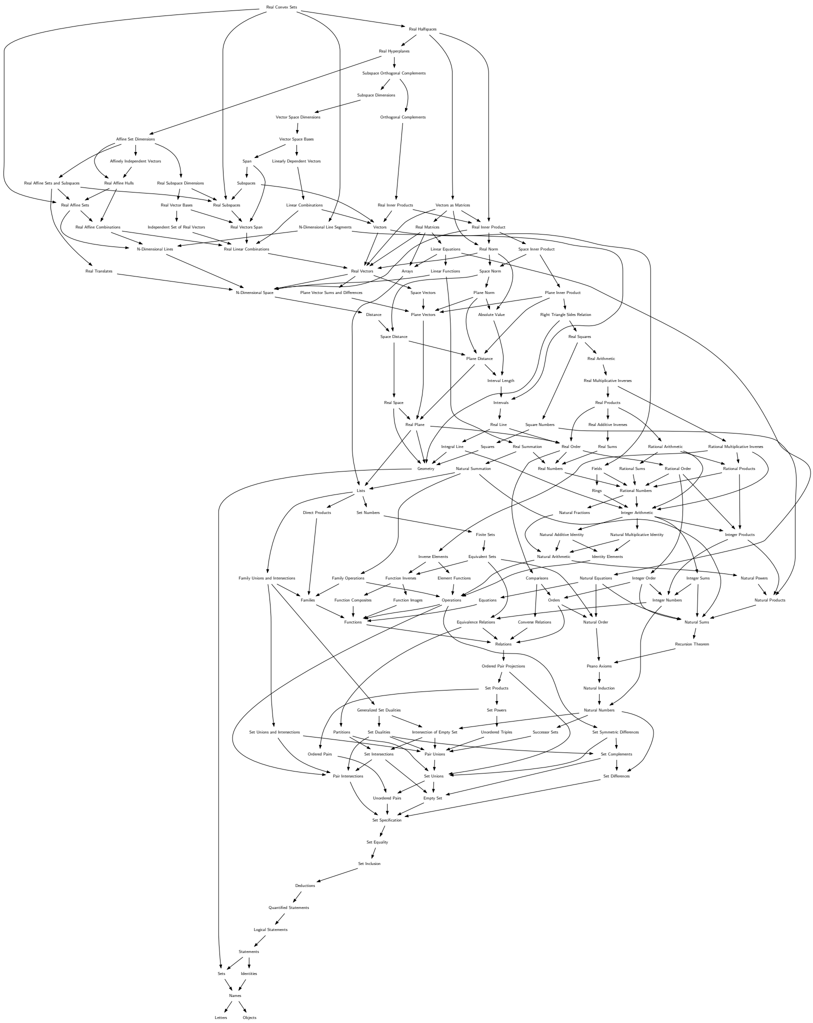
Examples

The empty set, any singleton, any subspace, any affine set and any half-space.

Properties

Proposition 1 (closure under intersections)**.** *Suppose $\mathcal{K} \subset \mathcal{P}(\mathbf{R}^n)$ is a set of convex sets. Then $\cap\mathcal{K}$ is convex.*

Proposition 2 (sums, differences, scales are convex)**.** *Suppose A, B are convex sets. Then $A + B$, $A - B$ and λA for any real λ is convex.*


Real Convex Sets
Real Halfspaces
Real Hyperplanes
Subspace Orthogonal Complements
Subspace Dimensions
Vector Space Dimensions
Orthogonal Complements
Vector Space Bases
Affine Set Dimensions
Affinely Independent Vectors
Span
Linearly Dependent Vectors
Real Affine Sets and Subspaces
Real Affine Hulls
Real Subspace Dimensions
Subspaces
Real Affine Sets
Real Vector Bases
Real Subspaces
Linear Combinations
Real Inner Products
Vectors as Matrices
Real Affine Combinations
Independent Set of Real Vectors
Real Vectors Span
N-Dimensional Line Segments
Vectors
Real Matrices
Real Inner Product
N-Dimensional Lines
Real Linear Combinations
Linear Equations
Real Norm
Space Inner Product
Real Translates
Real Vectors
Arrays
Linear Functions
Space Norm
N-Dimensional Space
Plane Vector Sums and Differences
Space Vectors
Plane Norm
Plane Inner Product
Distance
Plane Vectors
Absolute Value
Right Triangle Sides Relation
Space Distance
Real Squares
Plane Distance
Real Arithmetic
Interval Length
Real Multiplicative Inverses
Real Space
Intervals
Real Products
Real Plane
Real Line
Square Numbers
Real Additive Inverses
Integral Line
Squares
Real Summation
Real Order
Real Sums
Rational Arithmetic
Rational Multiplicative Inverses
Geometry
Natural Summation
Real Numbers
Fields
Rational Sums
Rational Order
Rational Products
Lists
Rings
Rational Numbers
Direct Products
Set Numbers
Natural Fractions
Integer Arithmetic
Finite Sets
Natural Additive Identity
Natural Multiplicative Identity
Integer Products
Inverse Elements
Equivalent Sets
Natural Arithmetic
Identity Elements
Family Unions and Intersections
Family Operations
Function Inverses
Element Functions
Comparisons
Natural Equations
Integer Order
Integer Sums
Natural Powers
Families
Function Composites
Function Images
Operations
Equations
Orders
Integer Numbers
Natural Products
Functions
Equivalence Relations
Converse Relations
Natural Order
Natural Sums
Relations
Recursion Theorem
Ordered Pair Projections
Peano Axioms
Set Products
Natural Induction
Generalized Set Dualities
Set Powers
Natural Numbers
Set Unions and Intersections
Partitions
Set Dualities
Intersection of Empty Set
Unordered Triples
Successor Sets
Set Symmetric Differences
Ordered Pairs
Set Intersections
Pair Unions
Set Complements
Pair Intersections
Set Unions
Set Differences
Unordered Pairs
Empty Set
Set Specification
Set Equality
Set Inclusion
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects