Why

We generalize convex functions to arbitrary vector spaces.

Definition

Suppose $(X, \mathbf{R})$ is a real vector space. Then $f : X \to \mathbf{R}$ is *convex* if

$$f(tx + (1-t)y) \leq tf(x) + (1-t)f(y)$$

for all $t \in [0, 1]$ and $x, y \in X$.

Example

Any norm is a convex function.


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