**Why**

We speak of functions which always bends up.[1]

**Definition**

A *convex* real-valued function is a function defined on a convex set of real numbers for which the result of the function on a convex combination of any two points in the domain is smaller than the convex combination of the same length of the value of the function on the endpoints.[2] A function $f : \mathbf{R} \to \mathbf{R}$ is *concave* if the function $-f$ is convex.

**Notation**

Let $A \subset \mathbf{R}$ be a convex set. The function $f : A \to \mathbf{R}$ is convex if, for any $a, b \in A$ and $t \in [0, 1]$,

$$f(ta + (1 - t)b) \leq tf(a) + (1 - t)f(b).$$

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[1]Future editions may expand.
[2]Future editions will include figures

Real Convex Functions

Real Convex Sets

N-Dimensional Space · Real Functions

Distance

Space Distance

Plane Distance

Interval Length

Real Space · Intervals

Real Plane · Real Line

Integral Line · Real Order

Geometry · Real Numbers · Rational Order

Lists · Rational Numbers

Direct Products · Set Numbers · Integer Arithmetic

Finite Sets · Natural Multiplicative Identity · Natural Additive Identity · Integer Products

Equivalent Sets · Identity Elements · Arithmetic

Family Unions and Intersections · Function Inverses · Comparisons · Integer Order · Integer Sums · Natural Powers

Families · Function Composites · Function Images · Operations · Orders · Integer Numbers · Natural Products

Functions · Converse Relations · Natural Order · Equivalence Relations · 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 · 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

Sets · Identities

Names

Letters · Objects