Why

We can interpret a real function as tracing a path as we move from left to right in its domain.[1] We want language for whether this tracing increases or decreases the range values.

Definition

Let $A \subset \mathbf{R}$ and let $f : A \to \mathbf{R}$. A function is *monotone increasing* if $f(x) < f(y)$ whenever $x < y$, and *monotone nondecreasing* if $f(x) \leq f(y)$ whenever $x, y \in \mathbf{R}$ and $x < y$.[2] Similarly we define *monotone decreasing* and *monotone nonincreasing*.

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[1]Future editions will likely have this interpretation in a separate sheet.

[2]Unforunately, some authors use "monotone increasing" for "monotone nondecreasing" and use the terminolgy *strictly monotone increasing* for "monotone increasing".

Monotone Real Functions

Real Functions

Intervals

Real Line

Real Order

Real Numbers   Rational Order

Integral Line   Rational Numbers

Integer Arithmetic

Natural Additive Identity   Natural Multiplicative Identity   Integer Products

Identity Elements   Arithmetic

Natural Powers

Natural Products   Integer Sums   Integer Order   Comparisons

Operations   Natural Sums   Integer Numbers   Orders

Functions   Recursion Theorem   Equivalence Relations   Natural Order   Converse Relations

Peano Axioms   Relations

Natural Induction   Set Products

Natural Numbers   Set Powers   Ordered Pairs

Partitions   Intersection of Empty Set   Successor Sets   Unordered Triples

Set Symmetric Differences   Set Intersections   Pair Unions

Pair Intersections   Set Complements   Set Unions

Empty Set   Set Differences   Unordered Pairs

Geometry   Set Specification

Set Equality

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets   Identities

Names

Letters   Objects

4