Why

We want a notation for expressing the sum of a sequence of real numbers.

Definition

Let $x = (x_1, \ldots, x_n)$ be a sequence of real numbers. The *sequence sum* of x is the result of first summing the first two numbers, then summing the result with the third number, and so on, until we have summed all the numbers.

Notation

Let $x = (x_1, \ldots, x_n)$ be a sequence of real numbers. We denote the sequence sum of x by

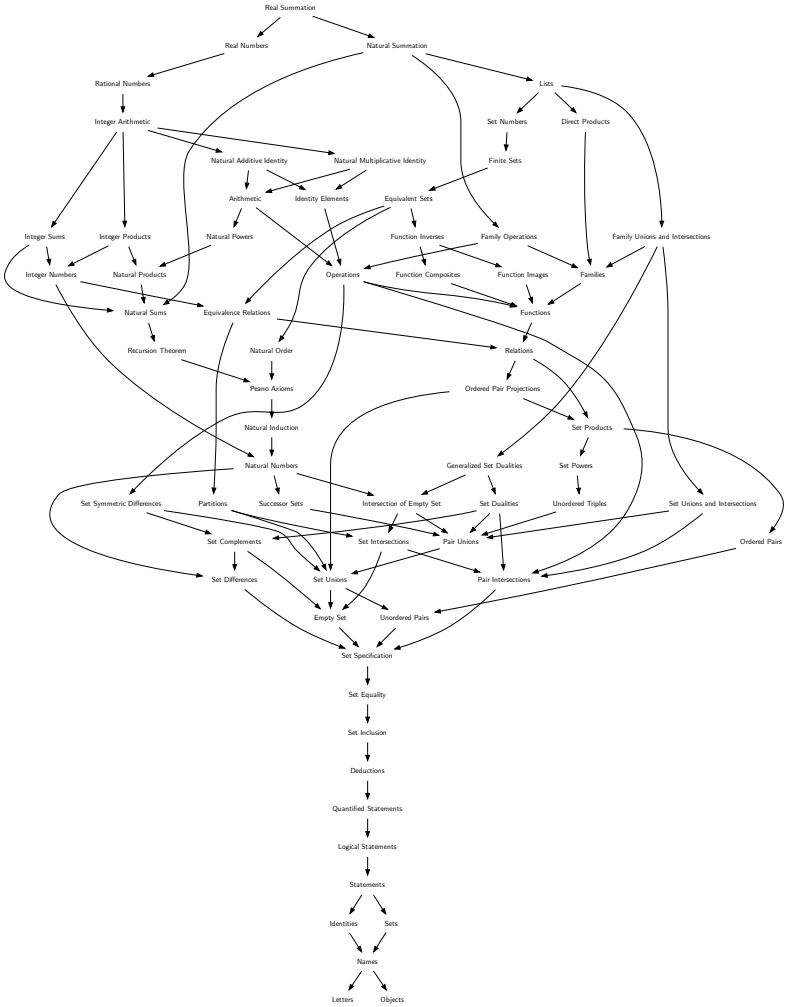
$$\sum_{i=1}^{n} x_i$$

Summing over finite sets

Suppose A is a finite set and $f : A \to \mathbf{R}$ is a function. Then we the notation

$$\sum_{a \in A} f(a)$$

is notation for $\sum_{i=1}^{n} f(\sigma(i))$ where $\sigma : \{1, \ldots, |A|\} \to A$ is any numbering of A. The numbering is inconsequential because addition is commutative.


Real Summation
Real Numbers
Natural Summation
Rational Numbers
Lists
Integer Arithmetic
Set Numbers
Direct Products
Natural Additive Identity
Natural Multiplicative Identity
Finite Sets
Arithmetic
Identity Elements
Equivalent Sets
Integer Sums
Integer Products
Natural Powers
Function Inverses
Family Operations
Family Unions and Intersections
Integer Numbers
Natural Products
Operations
Function Composites
Function Images
Families
Natural Sums
Equivalence Relations
Functions
Recursion Theorem
Natural Order
Relations
Peano Axioms
Ordered Pair Projections
Natural Induction
Set Products
Natural Numbers
Generalized Set Dualities
Set Powers
Set Symmetric Differences
Partitions
Successor Sets
Intersection of Empty Set
Set Dualities
Unordered Triples
Set Unions and Intersections
Set Complements
Set Intersections
Pair Unions
Ordered Pairs
Set Differences
Set Unions
Pair Intersections
Empty Set
Unordered Pairs
Set Specification
Set Equality
Set Inclusion
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects