Why

We want to generalize operations beyond two objects.

Operations

The *pairwise extension* of a commutative operation is the function from finite families of the ground set to the ground setobtained by applying the operation pairwise to elements. TODO: this is not a function if the operation is not commutative.

The *ordered pairwise extension* of an operation is the function from finite families ground set to the ground set obtained by applying the operation pairwise to elements in order.

Notation

Let $(A, +)$ be an algebra and $\{A_i\}_{i=1}^n$ a finite family of elements of A. We denote the pairwise extension by

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

Family Operations

Families Operations

Functions

Relations Pair Intersections

Ordered Pair Projections

Set Products

Set Powers

Ordered Pairs Unordered Triples

Pair Unions Set Symmetric Differences

Set Unions Set Complements

Unordered Pairs Empty Set Set Differences

Set Specification

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Identities Sets

Names

Letters Objects