Why

We generalize the idea of a product of two sets to a product of n sets.

Direct Products

The *direct product* of a natural family is the set of ordered sequences of elements from each set in the family. We call the elements of the direct product *n-tuples*. We call the ith element in an n-tuple the ith coordinate. This language is meant to follow that used in defining ordered pairs. Two coordinates in a sequence are *consecutive* if their natural difference is 1.

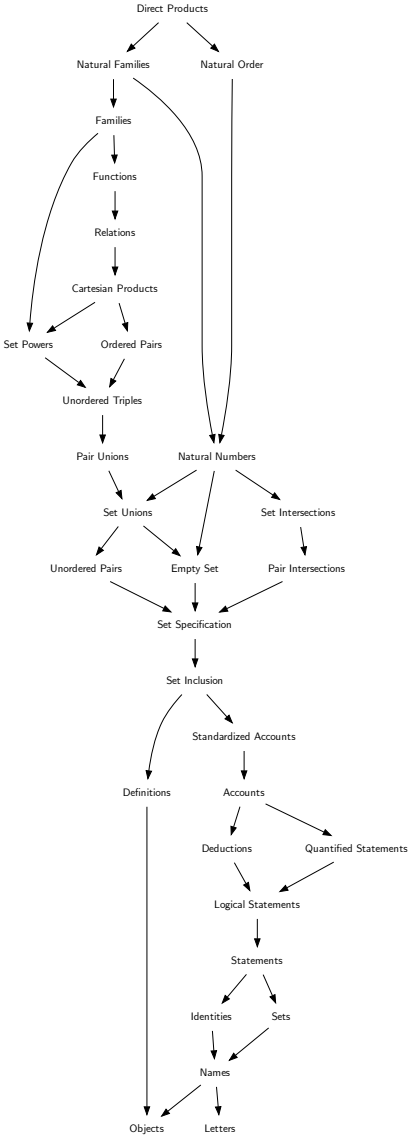
Notation

Let $A_1, \ldots, A_n$ be a natural family of sets. We denote its direct product by

$$\prod_{i=1}^{n} A_i.$$

We read this notation as "product over alpha in I of A sub-alpha." We denote an element of $\prod_{i=1}^{n} A_i$ by $(a_1, a_2, \ldots, a_n)$ with the understanding that $a_1 \in A_1, a_2 \in A_2, \ldots, a_n \in A_n$.

If $A_i = A$ for $i = 1, \ldots, n$, then we denote $\prod_{i=1}^{n} A_i$ by A^n.


Direct Products
Natural Families
Natural Order
Families
Functions
Relations
Cartesian Products
Set Powers
Ordered Pairs
Unordered Triples
Pair Unions
Natural Numbers
Set Unions
Set Intersections
Unordered Pairs
Empty Set
Pair Intersections
Set Specification
Set Inclusion
Standardized Accounts
Definitions
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Objects
Letters