Why

We want language and notation for recording elements of a set.

Definition

A *dataset* of size n *in* (or *from*) a non-empty set A is a finite sequence in A (in other words, an element of the direct product A^n). In other words, it is an n-tuple. In the case that we speak of a dataset, we call its coordinates the records. So, for example, we call the first coordinate the first record and the second coordinate the second record. The ith coordinate is the ith record, for $i = 1, \ldots, n$.

Although the terminology dataset is standard, datasets are not sets. Datasets may contain an element multiple times. Thus we use the single word "dataset," in contrast with the two words "data set," which may together suggest that the object involved was a set.

In the case that the dataset is from a set A which is a product of two sets (say, $\mathcal{U}$ and $\mathcal{V}$, so that $A = \mathcal{U} \times \mathcal{V}$) we say that it is a dataset of *record pairs*. A record pair is sometimes called an *observation*.

Notation

Let A be a non-empty set. Although we usually denote sequences by $(a_1, \ldots, a_n)$, we will denote datasets by $(a^1, \ldots, a^n)$; notably, using a superscript. Often A is itself a set of se-

quences, and so we will want to refer to the ith component of a^1 by a^1_i.

Datasets

Sequences

Direct Products Set Numbers

Finite Sets

Equivalent Sets

Family Unions and Intersections Natural Order Function Inverses

Families Function Composites Function Images

Peano Axioms Functions Equivalence Relations

Natural Induction Relations

Set Products

Generalized Set Dualities Natural Numbers Set Powers

Set Dualities Set Unions and Intersections Intersection of Empty Set Successor Sets Unordered Triples Partitions

Set Complements Pair Unions Set Intersections Ordered Pairs

Set Differences Pair Intersections Set Unions

Empty Set Unordered Pairs

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Identities Sets

Names

Letters Objects