Why

We often use functions to keep track of several objects by the objects of some well-known set with which they correspond. In this case, we use specific language and notation.

Definition

Let I and X denote sets. A *family* is a function from I to X. We call an element of I an *index* and we call I the *index set*. Of course, the letter I was picked here to be a mnemonic for "index". We call the range of the family the *indexed set* and we call the value of the family at an index i a *term* of the family at i or the *ith term* of the family.

Experience shows that it is useful to discuss sets using indices, especially when discussing a set of sets. If the values of the family are sets, we speak of a *family of sets*. Indeed, we often speak of a *family of* whatever object the values of the function are. So for instance, a family of subsets of X is understood to be a function from some index set into $\mathcal{P}(X)$.

Notation

Let $x : I \to X$ be a family. We denote the ith term of x by x_i. We sometimes denote the family by $\{x_i\}_{i \in I}$.

Families

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Functions

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Relations

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Ordered Pair Projections

Set Products

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Set Powers

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Ordered Pairs

Unordered Triples

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Pair Unions

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Set Unions

↓ ↘

Unordered Pairs

Empty Set

↓ ↘

Set Specification

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Set Equality

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Set Inclusion

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Deductions

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Quantified Statements

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Logical Statements

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Statements

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Identities

Sets

↘ ↙

Names

↙ ↘

Letters

Objects