Why

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Definition

Let X be a set and let A be a finite set. We denote the set of all finite sequences (strings) in A by $\mathcal{S}(A)$. We read $\mathcal{S}(A)$ aloud as "the strings in A." The length zero string is $\varnothing$.

A *code* for X *in* A is a function from X to $\mathcal{S}(A)$. In this context, we refer to the finite set A as an *alphabet* and we call $c(x)$ the *codeword* of x. The *length* of $x \in X$, with respect to a code $c : X \to \mathcal{S}(A)$, is the length of the sequence $c(x)$ (its codeword). We call a code *nonsingular* if it is injective.

Examples

Define $c : \{\alpha, \beta\} \to \{0, 1\}$ by $c(\alpha) = (0,)$ and $c(\beta) = (1,).$[2]

Code extensions

Let $s, t \in \mathcal{S}(A)$ of length m and n respectively. The *concatenation* of s with t is the length $m + n$ string $u \in \mathcal{S}(A)$ defined by $u_1 = s_1, \ldots, u_m = s_m$ and $u_{m+1} = t_1, \ldots, u_{m+n} = t_n$. We denote the concatenation of s and t by st. Note, however, that $st \neq ts$, although $s(tr) = (st)r$.

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[1]Future editions will include, with perhaps discussion of encoding a representing text.

[2]Future editions will include additional examples.

Given a code $c : X \to \mathcal{S}(A)$, we can produce a code for $\mathcal{S}(X)$ in a natural way. The *extension* of c is the function $C : \mathcal{S}(X) \to \mathcal{S}(A)$ defined, for $\xi = (\xi_1, \ldots, \xi_n) \in \mathcal{S}(X)$, by

$$C(\xi) = c(\xi_1) \cdots c(\xi_n).$$

We call an code *uniquely decodable* if its extension is injective. In other words, given the code $C(\xi)$ for a sequence $\xi \in \mathcal{S}(X)$, we can recover ξ. We call $C(\xi)$ the *encoding* of ξ. We call ξ the *decoding* of $C(\xi)$.

Codes

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

Cartesian 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

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