Why

We want language for recording the elements of some set that appear at regular intervals of time.

Definition

Let A be a set. An *observation sequence* (or *time series*) in A is a mapping $a : \mathbf{Z} \to A$.

If $A = \mathbf{R}^d$ in which case we call a a *vector-valued observation sequence* or *vector-valued time series*.

Examples

Examples include temperature readings, seismograph readings, sunspot numbers, export quantities, and so on.

Time invariance

The most basic assumption we can make is that the observation sequence a exhibits some regularity over time. This assumption is naturally related to the assumption of time-invariance in physical laws.[1]

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[1] Future editions will expand on this discussion.

Observation Sequences

Vectors

Real Vectors

N-Dimensional Space   Space Vectors   Plane Vector Sums and Differences

Distance   Plane Vectors

Space Distance

Plane Distance

Interval Length

Real Space   Intervals

Real Plane   Real Line

Integral Line   Real Order

Geometry   Real Numbers   Fields   Rational Order

Rational Numbers   Rings

Lists   Integer Arithmetic

Set Numbers   Natural Additive Identity   Natural Multiplicative Identity   Integer Products

Finite Sets   Identity Elements   Arithmetic

Direct Products   Equivalent Sets   Natural Powers

Family Unions and Intersections   Function Inverses   Comparisons   Natural Products   Integer Order   Integer Sums

Families   Function Composites   Function Images   Operations   Orders   Natural Sums   Integer Numbers

Functions   Converse Relations   Equivalence Relations   Natural Order   Recursion Theorem

Relations   Peano Axioms

Set Products   Natural Induction

Generalized Set Dualities   Set Powers   Natural Numbers

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

Ordered Pairs   Pair Unions   Set Intersections   Set Complements

Pair Intersections   Set Unions   Set Differences

Unordered Pairs   Empty Set

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets   Identities

Names

Letters   Objects

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