Why

[1]

Definition

The *data matrix* corresponding to a data set of n records which are length d tuples of real numbers is the n by d matrix whose ith row is the i element of the data set. Some authors refer to the data matrix as the *design matrix*.

Notation

Let $(a^1, \ldots, a^n)$ where $a^i \in \mathbf{R}^n$ for $i = 1, \ldots, n$. Let A be the $n \times d$ matrix whose rows are the a^i. Then A is the data matrix of $(a^1, \ldots, a^n)$. In other words,

$$A = \begin{bmatrix} (a^1)^\top \\ \cdots \\ (a^n)^\top \end{bmatrix}.$$

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[1] Future editions will retire this sheet.

Data Matrix

Vectors as Matrices

Real Inner Product — Real Matrices — Linear Equations

Real Norm

Space Norm — Real Vector — Linear Functions

Plane Inner Product — Plane Norm — Space Vectors — Plane Vector Sums and Differences — N-Dimensional Space

Right Triangle Sides Relation — Absolute Value — Plane Vector — Distance

Real Squares — Space Distance

Real Arithmetic — Plane Distance

Real Multiplicative Inverse — Interval Length

Real Products — Intervals — Real Space

Square Numbers — Real Additive Inverse — Real Line — Real Plane

Rational Multiplicative Inverse — Rational Arithmetic — Integral Line — Square — Real Sums — Real Order — Real Summation

Rational Products — Rational Sums — Geometry — Real Numbers — Rational Order

Rational Number

Integer Arithmetic — Arrays

Lists

Natural Multiplicative Identity — Natural Additive Identity — Integer Products — Set Numbers

Identity Elements — Arithmetic — Direct Products — Finite Sets

Inverse Elements — Natural Powers — Natural Summation — Equivalent Sets

Element Functions — Function Inverse — Integer Sums — Natural Products — Integer Order — Comparisons — Family Operations — Natural Equations — Family Unions and Intersections

Operations — Function Composites — Function Images — Integer Integers — Natural Sum — Orders — Families — Equations

Functions — Converse Relations — Equivalence Relations — Recursion Theorem — Natural Order

Relations — Peano Axioms

Set Products — Natural Induction

Set Powers — Natural Numbers — Generalized Set Dualities

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

Ordered Pairs — Set Complements — Set Intersections — Pair Unions

Set Unions — Set Differences — Pair Intersections

Unordered Pairs — Empty Set

Set Specification

Set Equality

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets — Identities

Names

Letters — Objects