Why

We can think of a list of two numbers as displacement in the plane, and a list of three numbers as displacement in space. More generally, we can think of a list of n numbers as displacement in $\mathbf{R}^n$. Moreover, we can define algebraic operations on the points in $\mathbf{R}^n$ which have geometric interpretations.

Definition

A *vector* (*real vector*) is a list of real numbers.

Result

For $x, y \in \mathbf{R}^n$, define $x + y$ by

$$(x_1 + y_1, \ldots, x_n + y_n)$$

and for $\alpha \in \mathbf{R}$, define $\alpha \cdot x$

$$(\alpha x_1, \ldots, \alpha x_n).$$

Note on terminology

The etymology of the word "vector" is from the Latin "vector," meaning, literally, carrier. This sense is from the interpretation of a vector as indicating a displacement.[1]

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[1] Future editions may elide this discussion.

Real Vectors

N-Dimensional Space

Distance

Space Distance

Plane Distance

Interval Length

Intervals

Real Line

Real Plane

Real Space

Integral Line

Real Order

Geometry

Rational Order

Real Numbers

Rational Numbers

Integer Arithmetic

Sequences

Integer Products

Natural Multiplicative Identity

Natural Additive Identity

Set Numbers

Arithmetic

Identity Elements

Finite Sets

Direct Products

Natural Powers

Operations

Equivalent Sets

Integer Sums

Natural Products

Integer Order

Comparisons

Function Inverses

Family Unions and Intersections

Integer Numbers

Natural Sums

Orders

Function Composites

Function Images

Families

Recursion Theorem

Natural Order

Equivalence Relations

Converse Relations

Functions

Peano Axioms

Relations

Natural Induction

Set Products

Natural Numbers

Set Powers

Generalized Set Dualities

Partitions

Intersection of Empty Set

Successor Sets

Unordered Triples

Set Dualities

Set Unions and Intersections

Set Intersections

Pair Unions

Ordered Pairs

Set Complements

Set Differences

Set Unions

Pair Intersections

Unordered Pairs

Empty Set

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets

Identities

Names

Letters

Objects