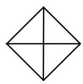


Definition

An *affine combination* from $\mathbf{R}^n$ is a linear combination whose scalars sum to 1. As with linear combinations, we say that y is an *can be written as an affine combination of* of the vectors $x_1, \ldots, x_k \in \mathbf{R}^n$ if there exists $\lambda_1, \ldots, \lambda_k \in \mathbf{R}$ so that

$$y = \sum_{i=1}^{k} \lambda_i x_i$$

and $\sum_{i=1}^{k} \lambda_i = 1$.

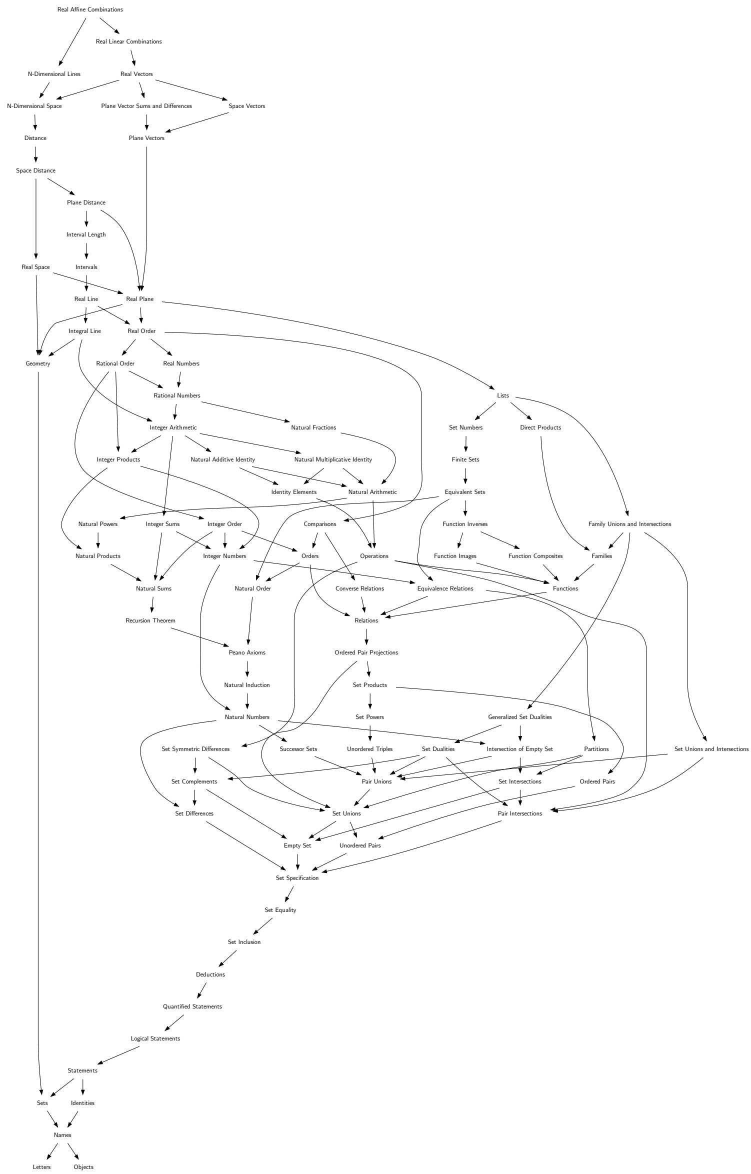
All affine combinations of two distint vectors $x, y \in \mathbf{R}^n$ is the line through x and y, which we denote as usual $L(x, y)$. In other words,

$$L(x, y) = \{(1 - \lambda x + \lambda y \mid \lambda \in \mathbf{R}\}$$

A set of vectors $\{v_1, \ldots, v_k\}$ is *affinely dependent* if one can be written as an affine combination of the others. A set of vectors which is not affinely dependent is called an *affinely independent set of vectors.* An equivalent condition is that there exist an affine combination in these vectors in which at least one scalar is nonzero and the sum of all the scalars is 1.

Proposition 1. *Suppose $y \in \mathbf{R}^n$. The set $X = \{x_1, \ldots, x_k\} \subset \mathbf{R}^n$ is affinely dependent if and only if $y + X$ is.*

Proposition 2. *Suppose $y \in \mathbf{R}^n$. The set $X = \{x_1, \ldots, x_k\} \subset \mathbf{R}^n$ is affinely dependent if and only if $y + X$ is.*


Real Affine Combinations
Real Linear Combinations
N-Dimensional Lines
Real Vectors
N-Dimensional Space
Plane Vector Sums and Differences
Space Vectors
Distance
Plane Vectors
Space Distance
Plane Distance
Interval Length
Real Space
Intervals
Real Line
Real Plane
Integral Line
Real Order
Geometry
Rational Order
Real Numbers
Rational Numbers
Lists
Integer Arithmetic
Natural Fractions
Set Numbers
Direct Products
Integer Products
Natural Additive Identity
Natural Multiplicative Identity
Finite Sets
Identity Elements
Natural Arithmetic
Equivalent Sets
Natural Powers
Integer Sums
Integer Order
Comparisons
Function Inverses
Family Unions and Intersections
Natural Products
Integer Numbers
Orders
Operations
Function Images
Function Composites
Families
Natural Sums
Natural Order
Converse Relations
Equivalence Relations
Functions
Recursion Theorem
Relations
Peano Axioms
Ordered Pair Projections
Natural Induction
Set Products
Natural Numbers
Set Powers
Generalized Set Dualities
Set Symmetric Differences
Successor Sets
Unordered Triples
Set Dualities
Intersection of Empty Set
Partitions
Set Unions and Intersections
Set Complements
Pair Unions
Set Intersections
Ordered Pairs
Set Differences
Set Unions
Pair Intersections
Empty Set
Unordered Pairs
Set Specification
Set Equality
Set Inclusion
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects