Definition

Suppose $U_1, \ldots, U_m$ are subspaces of a vector space V. The sum $M = U_1 + \cdots + U_m$ is called a *direct sum* if each element $x \in M$ can only be written in one way as a sum

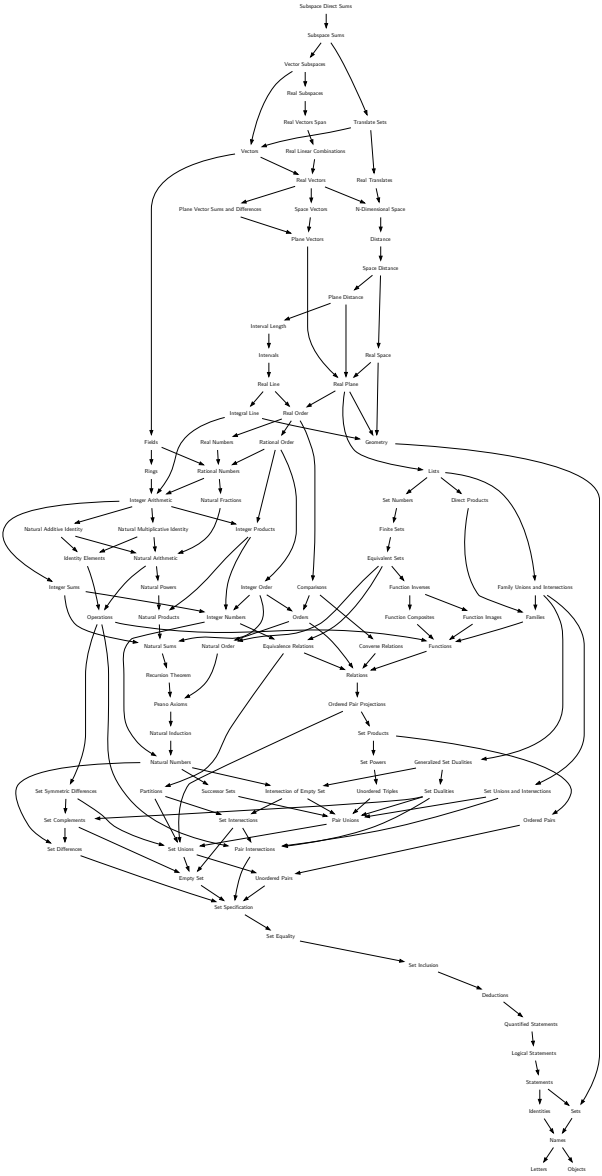
$$x = u_1 + \cdots + u_m$$

for $u_i \in U_i$, $i = 1, \ldots, m$. We call the sum *direct*. Conversely, we call $U_1, \ldots, U_m$ a *decomposition* of M.

Notation

If M is a direct sum of $U_1, \ldots, U_m$, we use the notation $\oplus$. We write

$$M = U_1 \oplus \cdots \oplus U_m$$


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