Why

We generalize the notion of real matrices, to matrices with elements in any set.

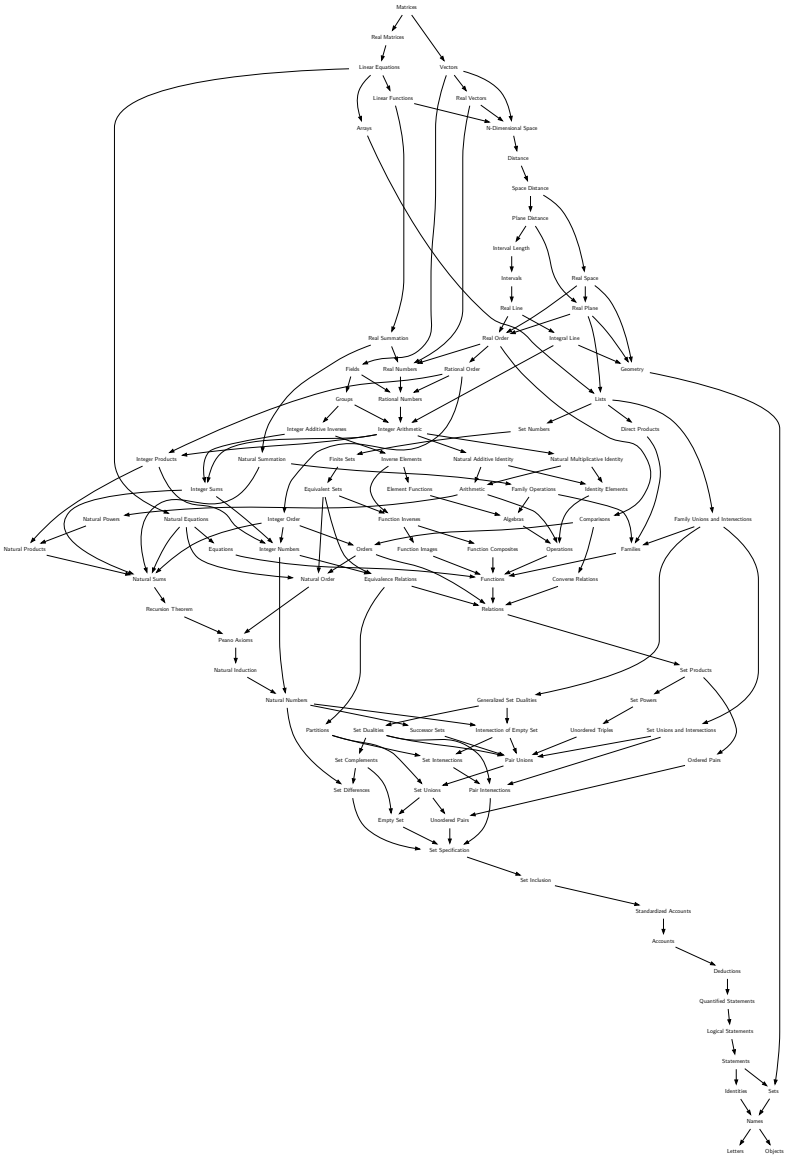
Definition

Consider two sets: the natural numbers from 1 to n and those from 1 to m. Consider a third non-empty set. A *matrix of* elements of the third set is a function from the cartesian product of the first two sets of natural numbers to the third set. We call such a function a *matrix*. We call the function's values the *entries* of the matrix.

We think of the objects in the third set as arrayed in a grid or arrayed in a table. We call n and m the *dimensions* of the matrix. We call n the *height* and m the *width*. If the height of the matrix is the same as the width of the matrix then we call the matrix *square*. If the height is larger than the width, we call the matrix *tall*. If the width is larger than the height, we call the matrix *wide*.

Notation

Let S be nonempty set. We denote the set of $n \times m$ S-valued matrices by $S^{n \times m}$. Let $a \in S^{n \times m}$. This means the same as $a : \{1, 2, \ldots, n\} \times \{1, 2, \ldots, m\} \to S$. We denote $a(i, j)$ by a_{ij}.


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