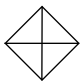


Why

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

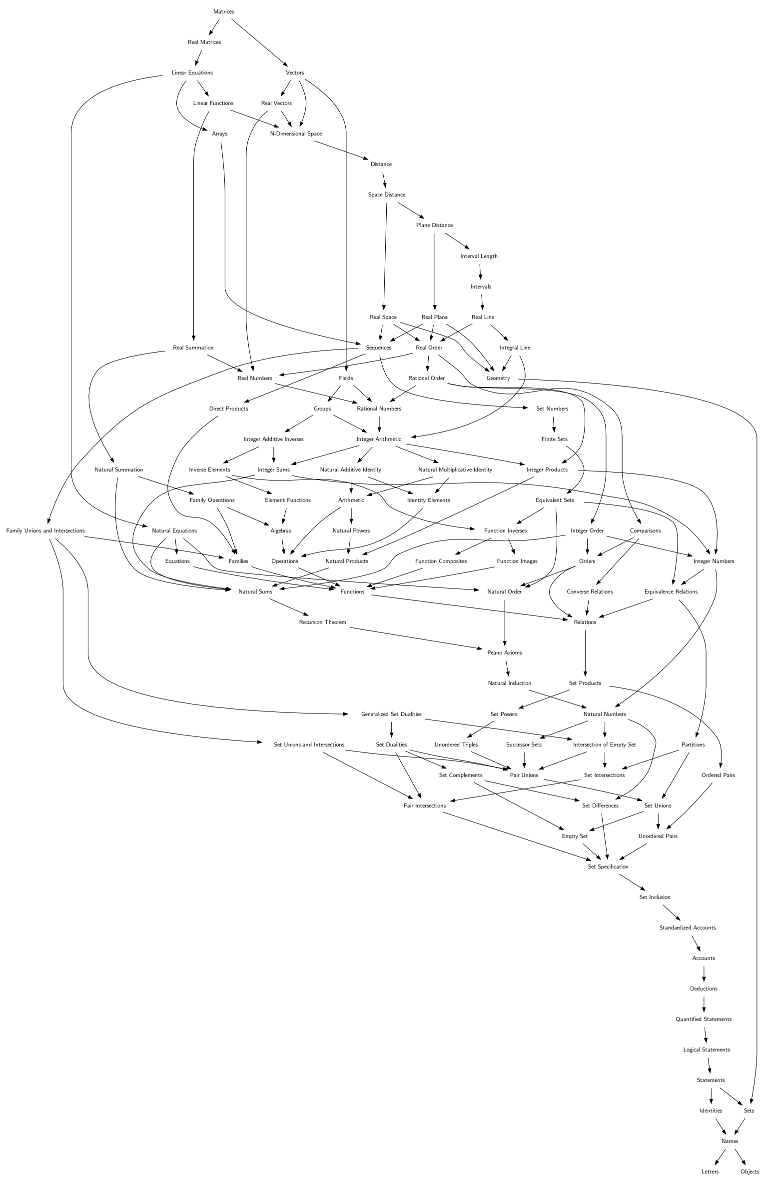
Definition

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 $a : \{1, 2, \dots, n\} \times \{1, 2, \dots, m\} \to S$. 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 Plane
Real Line
Real Summation
Sequences
Real Order
Integral Line
Real Numbers
Fields
Rational Order
Geometry
Direct Products
Groups
Rational Numbers
Set Numbers
Integer Additive Inverses
Integer Arithmetic
Finite Sets
Natural Summation
Inverse Elements
Integer Sums
Natural Additive Identity
Natural Multiplicative Identity
Integer Products
Family Operations
Element Functions
Arithmetic
Identity Elements
Equivalent Sets
Family Unions and Intersections
Natural Equations
Algebras
Natural Powers
Function Inverses
Integer Order
Comparisons
Equations
Families
Operations
Natural Products
Function Composites
Function Images
Orders
Integer Numbers
Natural Sums
Functions
Natural Order
Converse Relations
Equivalence Relations
Recursion Theorem
Relations
Peano Axioms
Natural Induction
Set Products
Generalized Set Dualities
Set Powers
Natural Numbers
Set Unions and Intersections
Set Dualities
Unordered Triples
Successor Sets
Intersection of Empty Set
Partitions
Set Complements
Pair Unions
Set Intersections
Ordered Pairs
Pair Intersections
Set Differences
Set Unions
Empty Set
Unordered Pairs
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects