Definition

A square real matrix is *symmetric* (we call it a a *symmetric matrix*) if its values do not depend on the order of the indices. In other words, a matrix is symmetric if the values above and below the diagonal are a mirror image.

Examples

The matrix

$$\begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$$

is symmetric. The matrix

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

is not.

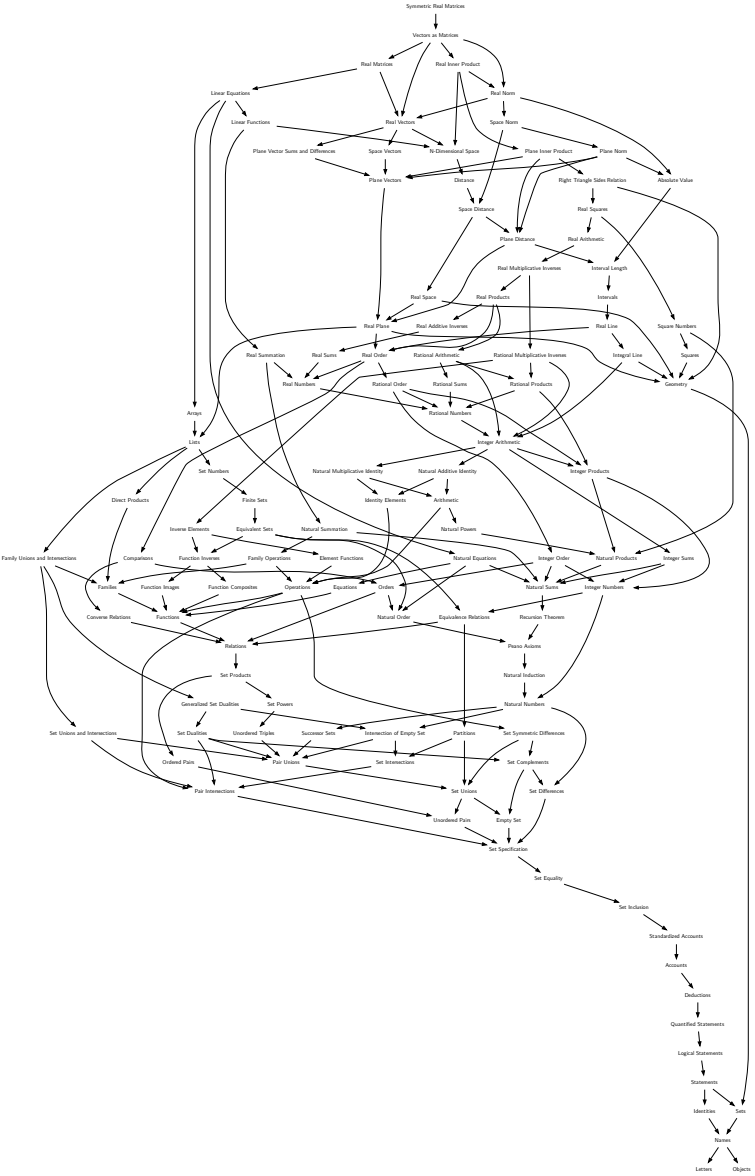
Notation

$A \in \mathbf{R}^{n \times n}$ is symmetric means $A^\top = A$.

We denote the set of symmetric $n \times n$ real matrices by $\mathbf{S}^n$. So

$$\mathbf{S}^n = \left\{ A \in \mathbf{R}^{n \times n} \;\middle|\; A^\top = A \right\}.$$

In particular, $\mathbf{S}^n \subset \mathbf{R}^{n \times n}$.


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