Why

[1]

Definition

Let$A \in \mathbf{R}^{n \times n}$ be symmetric. A is *positive definite* if, for all $x \in \mathbf{R}^d$, $x \neq 0$, $x^\top A x > 0$. A is *positive semidefinite* (or *nonnegative definite*) if, for all $x \in \mathbf{R}^d$, $x^\top A x \geq 0$.

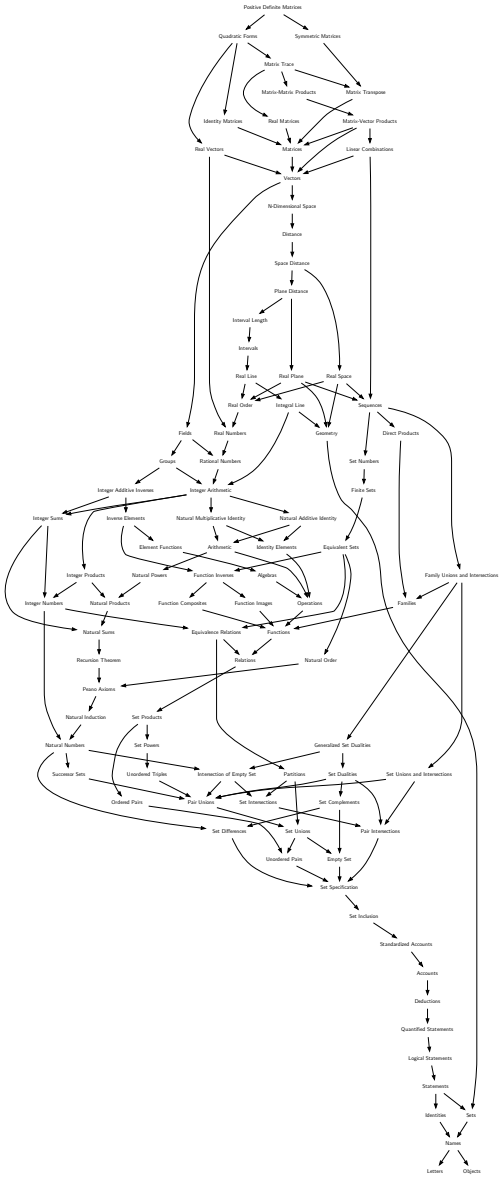
Notation

We denote the set of real-valued positive definite d by d matrices by $\mathbf{S}^d_{++}$. We denote the set of real-valued positive semidefinite d by d matrices by $\mathbf{S}^d_{+}$.

Characterizations

Proposition 1. *Let $A \in \mathbf{S}^d$ and denote the smallest*

[1] Future editions will elaborate.


Positive Definite Matrices
Quadratic Forms
Symmetric Matrices
Matrix Trace
Matrix-Matrix Products
Matrix Transpose
Identity Matrices
Real Matrices
Matrix-Vector Products
Real Vectors
Matrices
Linear Combinations
Vectors
N-Dimensional Space
Distance
Space Distance
Plane Distance
Interval Length
Intervals
Real Line
Real Plane
Real Space
Real Order
Integral Line
Sequences
Fields
Real Numbers
Geometry
Direct Products
Groups
Rational Numbers
Set Numbers
Integer Additive Inverses
Integer Arithmetic
Finite Sets
Integer Sums
Inverse Elements
Natural Multiplicative Identity
Natural Additive Identity
Element Functions
Arithmetic
Identity Elements
Equivalent Sets
Integer Products
Natural Powers
Function Inverses
Algebras
Family Unions and Intersections
Integer Numbers
Natural Products
Function Composition
Function Images
Operations
Families
Natural Sums
Equivalence Relations
Functions
Recursion Theorem
Relations
Natural Order
Peano Axioms
Natural Induction
Set Products
Natural Numbers
Set Powers
Generalized Set Dualities
Successor Sets
Unordered Triples
Intersection of Empty Set
Partitions
Set Dualities
Set Unions and Intersections
Ordered Pairs
Pair Unions
Set Intersections
Set Complements
Set Differences
Set Unions
Pair Intersections
Unordered Pairs
Empty Set
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Spaces
Letters
Objects