Why

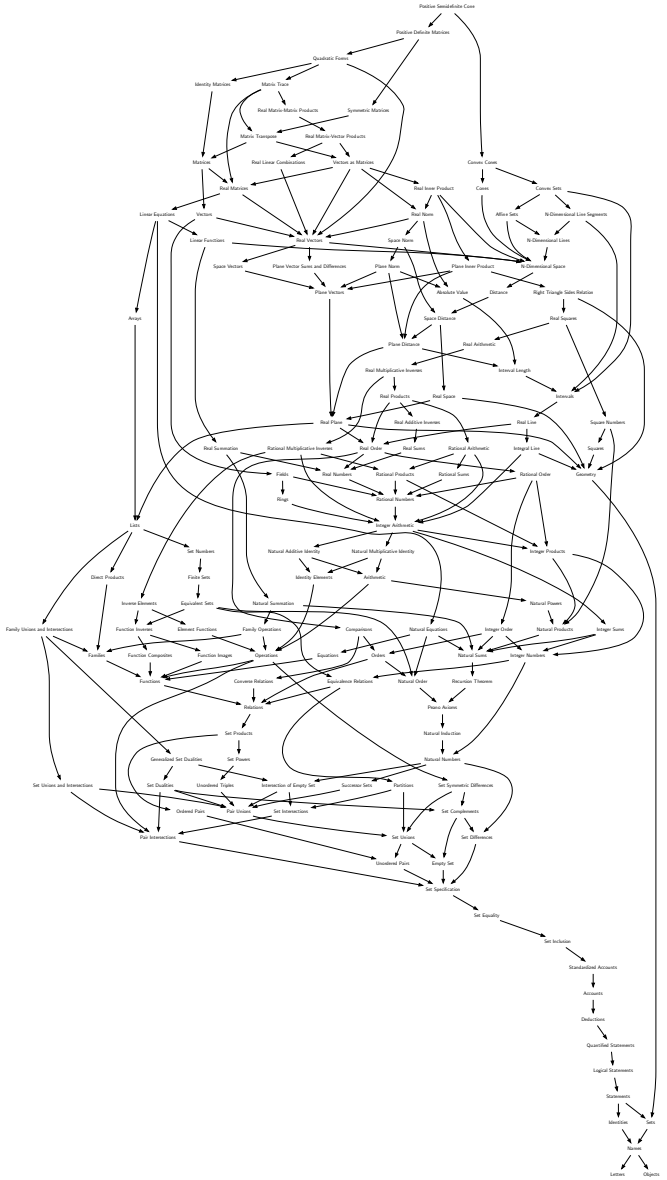
The set of positive semidefinite matrices has an attractive geometric structure.

Main result

Proposition 1. $\mathbf{S}_+^d$ *is a convex, pointed, closed cone with interior* $\mathbf{S}_{++}^d$ *relative to* $\mathbf{S}^d$.[1]

The cone of positive definite matrices is open.

[1] Future editions will contain a proof, which is by first principles.


Positive Semidefinite Cone
Positive Definite Matrices
Quadratic Forms
Identity Matrices
Matrix Trace
Real Matrix-Matrix Products
Symmetric Matrices
Matrix Transpose
Real Matrix-Vector Products
Matrices
Real Linear Combinations
Vectors as Matrices
Convex Cones
Real Matrices
Real Inner Product
Cones
Convex Sets
Linear Equations
Vectors
Real Norms
Affine Sets
N-Dimensional Line Segments
Linear Functions
Real Vectors
Space Norms
N-Dimensional Lines
Space Vectors
Plane Vector Sums and Differences
Plane Norms
Plane Inner Product
N-Dimensional Space
Plane Vectors
Absolute Value
Distance
Right Triangle Sides Relation
Arrays
Space Distance
Real Squares
Plane Distance
Real Arithmetic
Real Multiplicative Inverses
Interval Length
Intervals
Real Products
Real Space
Real Plane
Real Additive Inverses
Real Line
Square Numbers
Real Summation
Rational Multiplicative Inverses
Real Order
Real Sums
Rational Arithmetic
Integral Line
Squares
Fields
Real Numbers
Rational Products
Rational Sums
Rational Order
Geometry
Rings
Rational Numbers
Lists
Integer Arithmetic
Set Numbers
Natural Addition Identity
Natural Multiplicative Identity
Integer Products
Direct Products
Finite Sets
Identity Elements
Arithmetic
Inverse Elements
Equivalent Sets
Natural Summation
Natural Powers
Family Unions and Intersections
Function Inverses
Element Functions
Family Operations
Comparison
Natural Equations
Integer Order
Natural Products
Integer Sums
Families
Function Composites
Function Images
Operations
Equations
Order
Natural Sums
Integer Reciprocals
Functions
Converse Relations
Equivalence Relations
Natural Order
Recursion Theorem
Relations
Peano Axioms
Set Products
Natural Induction
Generalized Set Dualities
Set Powers
Natural Numbers
Set Unions and Intersections
Set Dualities
Unordered Triples
Intersection of Empty Set
Successor Sets
Fixations
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