Definition

Let $A \in \mathbf{S}^n$ (i.e., $A \in \mathbf{R}^{n \times n}$ and symmetric). A is *positive definite* if

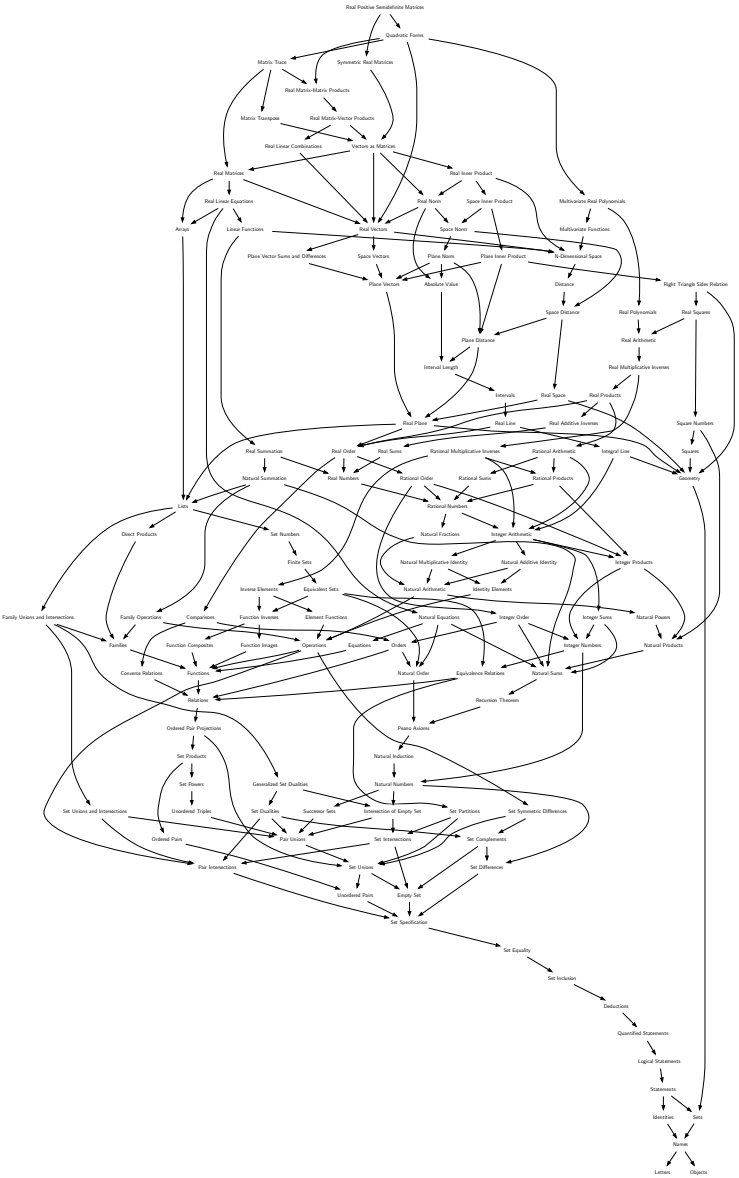
$$x^\top A x > 0 \quad \text{for all nonzero } x \in \mathbf{R}^d$$

A is *positive semidefinite* (or *nonnegative definite*) if

$$x^\top A x \geq 0 \quad \text{for all } x \in \mathbf{R}^d$$

Notation

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


Real Positive Semidefinite Matrices
Quadratic Forms
Matrix Trace
Symmetric Real Matrices
Real Matrix-Matrix Products
Matrix Transpose
Real Matrix-Vector Products
Real Linear Combinations
Vectors as Matrices
Real Matrices
Real Inner Product
Real Linear Equations
Real Norm
Space Inner Product
Multivariate Real Polynomials
Arrays
Linear Functions
Real Vectors
Space Norm
Multivariate Functions
Plane Vector Sums and Differences
Space Vectors
Plane Norm
Plane Inner Product
N-Dimensional Space
Plane Vectors
Absolute Value
Distance
Right Triangle Sides Relation
Space Distance
Real Polynomials
Real Squares
Plane Distance
Real Arithmetic
Interval Length
Real Multiplicative Inverses
Intervals
Real Space
Real Products
Real Plane
Real Line
Real Additive Inverses
Square Numbers
Real Summation
Real Order
Real Sums
Rational Multiplicative Inverses
Rational Arithmetic
Integral Line
Squares
Natural Summation
Real Numbers
Rational Order
Rational Sums
Rational Products
Geometry
Rational Numbers
Lists
Direct Products
Set Numbers
Natural Fractions
Integer Arithmetic
Finite Sets
Natural Multiplication Identity
Natural Additive Identity
Integer Products
Inverse Elements
Equivalent Sets
Natural Arithmetic
Identity Elements
Family Unions and Intersections
Family Operations
Comparisons
Function Inverses
Element Functions
Natural Equations
Integer Order
Integer Sums
Natural Powers
Families
Function Composites
Function Images
Operations
Equations
Orders
Integer Numbers
Natural Products
Converse Relations
Functions
Natural Order
Equivalence Relations
Natural Sums
Relations
Recursion Theorem
Ordered Pair Projections
Peano Axioms
Set Products
Natural Induction
Set Powers
Generalized Set Dualities
Natural Numbers
Set Unions and Intersections
Set Dualities
Successor Sets
Intersection of Empty Set
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
Deduction
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects