Why

[1]

Definition

A symmetric matrix $A \in \mathbf{R}^{n \times n}$ is *positive definite* if, for all $x \in \mathbf{R}^d$,

$$x^\top A x > 0.$$

A symmetric matrix $A \in \mathbf{R}^{n \times n}$ is *positive semidefinite* 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 $\mathbf{S}_+^d$.

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[1]Future editions will elaborate.

Positive Definite Matrices

Symmetric Matrices · Quadratic Forms · Real Matrices

Matrix Transpose · Identity Matrices

Matrices

Real Vectors

Vectors

N-Dimensional Space

Distance

Space Distance

Plane Distance

Interval Length

Intervals

Real Space · Real Line · Real Plane

Integral Line · Real Order

Fields

Geometry · Real Numbers

Groups · Rational Numbers

Sequences

Integer Additive Inverses · Integer Arithmetic

Set Numbers · Inverse Elements · Integer Sums · Natural Multiplicative Identity · Natural Additive Identity

Direct Products · Finite Sets · Element Functions · Identity Elements · Arithmetic

Equivalent Sets · Algebra · Natural Exponents · Integer Products

Family Unions and Intersections · Function Inverses · Operations · Integer Numbers · Natural Products

Families · Equivalence Relations · Function Composites · Function Images · Natural Sums

Functions · Natural Order · Recursion Theorem

Relations · Peano Axioms

Cartesian Products · Natural Induction

Generalized Set Dualities · Set Powers · Natural Numbers

Set Unions and Intersections · Partitions · Intersection of Empty Set · Set Dualities · Unordered Triples · Successor Sets

Set Intersections · Pair Unions · Set Complements · Ordered Pairs

Pair Intersections · Set Unions · Set Differences

Empty Set · Unordered Pairs

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Identities · Sets

Names

Letters · Objects