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 Plane   Real Line

Direct Products   Geometry   Real Order

Fields   Real Numbers

Families

Groups   Rational Numbers

Integer Additive Inverses   Integer Arithmetic

Inverse Elements   Natural Multiplicative Identity   Natural Additive Identity   Integer Sums

Element Functions   Identity Elements   Arithmetic

Function Inverses   Algebras   Natural Exponents   Natural Products

Function Composition   Function Images   Operations

Functions   Natural Sums   Integer Products

Integer Numbers

Recursion Theorem   Equivalence Relations

Relations   Peano Axioms

Cartesian Products   Natural Induction

Set Powers   Natural Numbers

Unordered Triples   Successor Sets   Intersection of Empty Set   Partitions

Ordered Pairs   Pair Unions   Set Intersections

Set Differences   Set Unions

Unordered Pairs   Empty Set   Pair Intersections

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets   Identities

Names

Letters   Objects