Why

[1]

Definition

The *square* of a square matrix is the product of the matrix with itself. A *square root* (or *matrix square root*) of a given matrix is a matrix whose square is the given matrix. A matrix is *idempotent* if it is equal to its square.

Notation

Let $A \in \mathbf{R}^{n \times n}$. Then the square of A is AA. We denote the square of A by A^2. A is idempotent if $A^2 = A$. $B \in \mathbf{R}^{n \times n}$ is a square root of A if $A = B^2$.

Existence and uniqueness

Clearly a matrix can have a square root. Take for example the matrix in $\mathbf{R}^{1 \times 1}$ $\begin{bmatrix} 1 \end{bmatrix}$. A square root of this matrix is $\begin{pmatrix} 1 \end{pmatrix}$, but also $\begin{pmatrix} -1 \end{pmatrix}$. So matrix square roots do exist, but are not unique.

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[1]Future editions will include an account.

Matrix Squares

Matrix-Matrix Products

Matrix-Vector Products

Linear Combinations Matrices

Vectors

N-Dimensional Space

Real Square Roots

Distance

Real Squares

Space Distance

Real Arithmetic

Plane Distance

Real Multiplicative Inverse

Interval Length

Real Products

Intervals

Real Additive Inverse

Real Plane Real Line Real Space

Real Order Real Sums Rational Multiplicative Inverse Rational Arithmetic

Integral Line

Fields Real Numbers Rational Products Rational Sums

Geometry

Groups Rational Numbers

Sequences

Direct Products

Set Number

Integer Additive Inverse Integer Arithmetic Natural Additive Identity Natural Multiplicative Identity Integer Products

Finite Sets

Inverse Elements Integer Sums Integer Numbers Natural Square Roots

Family Unions and Intersections

Equivalent Sets Element Functions Identity Elements Arithmetic Integer Numbers Natural Square Roots

Algebras Natural Equations Natural Exponents Square Numbers

Families Function Inverses Function Images

Function Composition Operations Equations Natural Order Natural Products Squares

Functions Equivalence Relations

Natural Sums

Relations

Recursion Theorem

Cartesian Products

Peano Axioms

Generalized Set Dualities Set Powers

Natural Induction

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

Natural Numbers

Set Complements Ordered Pairs Pair Unions Set Intersections

Pair Intersections Set Differences Set Unions

Empty Set Unordered Pairs

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets Identities

Names

Letters Objects