Definition

The *complex inner product* (or *dot product*, *scalar product*) of two complex vectors $x, y \in \mathbf{C}^n$ is

$$x_1 y_1 + x_2 y_2 + \cdots + x_n y_n$$

We denote the inner product of x and y by $\langle x, y \rangle$.

An *inner product space* is tuple whose first object is a vector space over the real or complex numbers and whose second object is a conforming inner product.

Other terminlogy

Some older authors use the term *pre-Hilbert space*.

Complex Inner Product

Real Inner Product

Space Inner Product   Real Norm

Space Norm   Real Vectors

Complex Numbers   Plane Inner Product   Plane Norm   Plane Vector Sums and Differences   Space Vectors   N-Dimensional Space

Absolute Value   Right Triangle Sides Relation   Plane Vectors   Distance

Real Squares   Plane Distance   Space Distance

Real Arithmetic

Real Multiplicative Inverse   Interval Length

Real Products   Square Numbers   Intervals   Real Space

Real Additive Inverse   Real Line   Real Plane

Rational Arithmetic   Real Sums   Rational Multiplicative Inverse   Real Order   Squares   Integral Line

Rational Sums   Rational Products   Real Numbers   Rational Order   Geometry

Rational Numbers   Lists

Natural Fractions   Integer Arithmetic   Set Numbers   Direct Products

Integer Products   Natural Additive Identity   Natural Multiplicative Identity   Finite Sets

Natural Arithmetic   Identity Elements   Equivalent Sets   Inverse Elements   Family Unions and Intersections

Natural Powers   Integer Sums   Integer Order   Comparisons   Element Functions   Function Inverses   Families

Natural Products   Integer Numbers   Operations   Function Composites   Function Images   Functions

Natural Sums   Natural Order   Orders   Converse Relations   Equivalence Relations

Recursion Theorem   Relations

Peano Axioms   Ordered Pair Projections

Natural Induction   Set Products

Natural Numbers   Set Powers   Generalized Set Dualities

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

Ordered Pairs   Set Complements   Pair Unions   Set Intersections

Set Differences   Set Unions   Pair Intersections

Unordered Pairs   Empty Set

Set Specification

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Identities   Sets

Names

Letters   Objects

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