Why

What is the distance between two points in space?

Definition

We define the distance between two points in space as the length of the line segment connecting them. In terms of their coordinates $(x_1, x_2, x_3), (y_1, y_2, x_3) \in \mathbf{R}^3$, the *space distance* of two points is

$$\sqrt{(x_1 - y_1)^2 + (x_2 - y_2)^2 + (x_3 - y_3)^2}.$$

This is sometimes referred to as the *Euclidean distance*. We have thus defined a function mapping $\mathbf{R}^3 \times \mathbf{R}^3$ into $\mathbf{R}$.

Space Distance

Plane Distance

Interval Length

Intervals

Real Line   Real Plane   Real Space

Integral Line   Real Order

Geometry   Real Numbers

Rational Numbers

Integer Arithmetic   Sequences

Natural Additive Identity   Natural Multiplicative Identity   Set Numbers   Direct Products

Arithmetic   Identity Elements   Finite Sets

Integer Products   Natural Exponents   Operations   Equivalent Sets

Integer Sums   Natural Products   Function Inverses   Family Unions and Intersections

Integer Numbers   Natural Sums   Function Composites   Function Images   Families

Recursion Theorem   Natural Order   Equivalence Relations   Functions

Peano Axioms   Relations

Natural Induction   Cartesian Products

Natural Numbers   Set Powers   Generalized Set Dualities

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

Set Intersections   Pair Unions   Ordered Pairs   Set Complements

Set Differences   Set Unions   Pair Intersections

Unordered Pairs   Empty Set

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets   Identities

Names

Letters   Objects

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