Why

Given n sets each with metrics, there is a standard way of turning the direct product of the sets into a metric space. In other words, defining a distance on the tuples of elements from the sets.

Motivating result

Proposition 1. *Let $(A_1, d_1), \ldots, (A_n, d_n)$ be metric spaces. Let A be $\prod_{i=1}^{n} A_n$ and let R be the set of real numbers. Define $d : A \times A \to R$ by*

$$d(a, b) = \max\{d_1(a_1, b_1), \ldots, d_n(a_n, b_n)\}.$$

Then (A, d) is a metric space.

We call d the *product metric*.

Product Metrics — Metrics — Distance — Absolute Value — Space Distance — Plane Distance — Interval Length — Intervals — Real Space — Real Line — Real Plane — Real Order — Integral Line — Rational Order — Real Numbers — Geometry — Rational Numbers — Lists — Natural Fractions — Integer Arithmetic — Set Numbers — Direct Products — Integer Products — Natural Multiplicative Identity — Natural Additive Identity — Finite Sets — Natural Arithmetic — Identity Elements — Equivalent Sets — Integer Order — Integer Sums — Natural Powers — Comparisons — Function Inverses — Family Unions and Intersections — Integer Numbers — Natural Products — Orders — Operations — Function Composites — Function Images — Families — Natural Sums — Equivalence Relations — Natural Order — Converse Relations — Functions — Recursion Theorem — Relations — Peano Axioms — Ordered Pair Projections — Natural Induction — Set Products — Natural Numbers — Generalized Set Dualities — Set Powers — Set Symmetric Differences — Partitions — Successor Sets — Intersection of Empty Set — Set Dualities — Unordered Triples — Set Unions and Intersections — Set Complements — Set Intersections — Pair Unions — Ordered Pairs — Set Differences — Set Unions — Pair Intersections — Empty Set — Unordered Pairs — Set Specification — Set Equality — Set Inclusion — Deductions — Quantified Statements — Logical Statements — Statements — Identities — Sets — Names — Letters — Objects