Why

We want to talk about probability on the set of outcomes which is the real numbers.

Definition

A *probability density* or *probability density function* is a real-valued function on the reals which is nonnegative and normalized. A real-valued function on the reals is *normalized* if it integrates to 1.

Notation

Let $f : \mathbf{R} \to \mathbf{R}$ with $f \geq 0$ and $\int f = 1$. Then f is a probability density.

Real Probability Densities

Probability Densities

Probability Distributions

Real Integrals

Nonnegative Integrals

Simple Integrals

Measurable Functions

Measures

Sigma Algebras

Extended Real Numbers

Real Series

Real Limits

Absolute Value

Simple Functions

Interval Length

Real Functions

Outcome Probabilities

Intervals

Real Line

Real Summation

Real Sequences

Real Order

Natural Summation

Sequence

Real Numbers

Rational Order

Subset Algebras

Lists

Rational Numbers

Integral Line

Cardinality

Direct Products

Integer Arithmetic

Set Numbers

Integer Products

Natural Additive Identity

Natural Multiplicative Identity

Finite Sets

Family Operations

Identity Elements

Arithmetic

Equivalent Sets

Family Unions and Intersections

Operations

Natural Powers

Integer Sums

Integer Order

Function Inverse

Comparisons

Families

Natural Products

Integer Numbers

Function Images

Function Composites

Orders

Natural Sums

Equivalence Relations

Functions

Natural Order

Converse Relations

Recursion Theorem

Peano Axioms

Relations

Uncertain Outcomes

Ordered Pair Projections

Natural Induction

Characteristic Functions

Set Products

Subset Systems

Generalized Set Dualities

Natural Numbers

Set Powers

Ordered Pairs

Set Unions and Intersections

Set Dualities

Intersection of Empty Set

Successor Sets

Unordered Triples

Set Symmetric Differences

Partitions

Pair Unions

Set Complements

Set Intersections

Pair Intersections

Set Differences

Set Unions

Empty Set

Unordered Pairs

Set Specification

Geometry

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Identities

Sets

Names

Letters

Objects

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