Why

What if the set of outcomes is the real line, **R**?

Definition

The principal difficulty is assigning nonzero numbers to infinitely many elements of a set. The solution is instead to assign probabilities to the *events* of outcomes, not to the individual outcomes (elementary events, real numbers), themselves.

A *probability density* (or *probability density function* (*pdf*)) is a function $f : \mathbf{R} \to \mathbf{R}$ satisfying $f \geq 0$ and $\int f = 1$.

Probability Densities

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

Probability Distributions

Intervals

Real Line

Real Sequences

Real Summation

Real Order

Rational Order

Sequences

Real Numbers

Rational Numbers

Integral Line

Subset Algebra

Cardinality

Lists

Integer Arithmetic

Set Numbers

Natural Summation

Natural Additive Identity

Natural Multiplicative Identity

Integer Products

Finite Sets

Family Operations

Identity Elements

Arithmetic

Natural Powers

Equivalent Sets

Direct Products

Operations

Natural Products

Function Inverse

Family Unions and Intersections

Comparisons

Integer Order

Integer Sums

Function Composites

Function Images

Families

Orders

Natural Sums

Integer Numbers

Equivalence Relations

Functions

Converse Relations

Natural Order

Recursion Theorem

Relations

Peano Axioms

Subset Systems

Set Products

Characteristic Functions

Natural Induction

Uncertain Outcomes

Ordered Pairs

Generalized Set Dualities

Set Powers

Natural Numbers

Set Unions and Intersections

Partitions

Intersection of Empty Set

Set Dualities

Unordered Triples

Successor Sets

Set Symmetric Differences

Set Intersections

Pair Unions

Set Complements

Pair Intersections

Set Unions

Set Differences

Unordered Pairs

Empty Set

Set Specification

Geometry

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Identities

Sets

Names

Letters

Objects