Definition

A *probability density function* of a real-valued random variable is a measurable function from the real numbers to real numbers which is (a) non-negative and (b) the integral of the function over a cover-length-measurable set with respect to the cover measure to the cover length is the probability that the random variable takes value in that set. We often abbreviate probability density function as *p.d.f*, read aloud as "pdf".

Notation

Let $(X, \mathcal{A}, \mu)$ be a probability space. Let f be a real-valued random variable on X. Let λ denote the cover length. A function $g : \mathbf{R} \to \mathbf{R}$ is a probability density of f if $g \geq 0$ and of f if

$$\mu(\{x \in X \mid f(x) \in A\}) = \int_A g d\lambda.$$

Uniqueness

Proposition 1. *If a probability density function exists, it is unique (up to almost everywhere).*

Probability Density Function
Probability Measures
Measure
Length Measure
Sigma Algebras
Extended Real Numbers
Real Sets
Real Limits
Event Probabilities
Absolute Value
Outcome Probabilities
Interval Length
Real Functions
Intervals
Real Line
Real Order
Real Summation
Real Sequences
Size of Direct Product
Rational Order
Real Numbers
Number of Set Products
Natural Summation
Sequences
Subset Algebras
Integral Line
Rational Numbers
Number of Disjoint Unions
Finite Set Examples
Lists
Cardinality
Integer Arithmetic
Set Numbers
Direct Products
Integer Products
Natural Fractions
Natural Multiplicative Identity
Natural Additive Identity
Finite Sets
Natural Arithmetic
Equivalent Sets
Identity Elements
Family Operations
Uncertain Events
Integer Sums
Integer Order
Natural Powers
Comparisons
Function Inverses
Operations
Family Unions and Intersections
Integer Numbers
Natural Products
Orders
Function Images
Function Composites
Families
Natural Sums
Equivalence Relations
Natural Order
Converse Relations
Functions
Recursion Theorem
Relations
Peano Axioms
Ordered Pair Projections
Uncertain Outcomes
Natural Induction
Set Products
Subset Systems
Natural Numbers
Generalized Set Dualities
Set Powers
Ordered Pairs
Set Symmetric Differences
Set Partitions
Set Dualities
Intersection of Empty Set
Successor Sets
Unordered Triples
Set Unions and Intersections
Set Complements
Set Intersections
Pair Unions
Set Differences
Set Unions
Pair Intersections
Empty Set
Unordered Pairs
Geometry
Set Specification
Set Equality
Set Inclusion
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects