Definition

Given a distribution $p : \Omega \to \mathbf{R}$, the *cumulative distribution* (or *cumulative distribution function, cdf*) of a random variable $x : \Omega \to \mathbf{R}$ is the function $F : \mathbf{R} \to \mathbf{R}$ defined by

$$F(t) = \mathbf{P}(x \leq t),$$

for all $t \in \mathbf{R}$.

Properties

The cumulative distribution of any random variable is

1. *piecewise constant* and

2. *right continuous.*

Cumulative Distributions

Induced Probability Distributions

Outcome Variable Events

Event Probabilities

Probability Distributions

Intervals

Real Line

Real Order

Real Summation

Rational Order   Real Numbers

Integral Line

Rational Numbers

Integer Arithmetic

Natural Multiplicative Identity   Natural Additive Identity   Integer Products

Arithmetic   Identity Elements   Natural Summation

Integer Order   Integer Sums   Natural Powers   Family Operations

Comparisons   Integer Numbers   Natural Products   Families   Operations

Converse Relations   Orders   Equivalence Relations   Natural Sums   Functions

Relations   Natural Order   Recursion Theorem

Ordered Pair Projections   Peano Axioms

Set Products   Natural Induction   Uncertain Outcomes

Ordered Pairs   Set Powers   Natural Numbers

Partitions   Intersection of Empty Set   Unordered Triples   Successor Sets

Set Intersections   Pair Unions   Set Symmetric Differences

Set Unions   Set Complements   Pair Intersections

Unordered Pairs   Empty Set   Set Differences

Geometry   Set Specification

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Sets   Identities

Names

Letters   Objects

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