Why

TODO

Definition

The *cumulative distribution function* of a real-valued random variable is the function mapping real numbers to the measure of the set of outcomes for which the random variable takes value less than or equal to that real number. The range of the cumulative distribution function is the interval $[0, 1]$, since the measure of the base set is one and all measures are non-negative.

Notation

Let $(X, \mathcal{A}, \mu)$ be a probability space. Let R denote the real numbers. Let $f : X \to R$ be a measurable function, and so a real-valued random variable. We denote the cumulative distribution function of f by $F_f : R \to [0, 1]$. We defined it by

$$F_f(t) = \mu(\{x \in X \mid f(x) \leq t\}).$$

Properties

Proposition 1. *The cumulative distribution function of any real-valued random variable*

1. *is non-decreasing,*

2. *is right-continuous,*

3. *tends to one as its argument tends toward infinity, and*

4. *tends to zero as its argument tends towards negative infinity.*

Proof. TODO $\square$


Cumulative Distribution Functions
Random Variables
Probability Measures
Measurable Functions
Measures
Event Probabilities
Extended Real Numbers
Topological Sigma Algebra
Probability Distributions
Real Limits
Topological Spaces
Probability Events
Real Summation
Intervals
Real Sequences
Metrics
Probability Outcomes
Natural Summation
Real Numbers
Sequences
Subset Algebras
Distance
Probability
Rational Numbers
Family Operations
Direct Products
Cardinality
Set Operations
Length Common Notions
Common Sense
Integer Numbers
Algebras
Natural Families
Injective Functions
Natural Order
Zero
Families
Operations
Function Composites
Subset Systems
Natural Sums
Equation Solutions
Power Set
Functions
Natural Numbers
Set Symmetric Differences
Relations
Set Unions
Set Intersections
Equations
Ordered Pairs
Set Complements
Unordered Pairs
Empty Set
Set Specification
Set Inclusion
Set Equality
Sentences
Identity
Sets
Objects