Why

If we have some outcomes and a distribution, we can construct a function which assigns probabilities to events.

Definition

The *probability of an event* is the sum of the probabilities of the outcomes in the event. The *event probability function* is the correspondence assigning events to their probabilities.

Notation

Let A be a set of outcomes and p a distribution on A. Let $B \subset A$ be an event. Let $\mathbf{P} : 2^A \to \mathbf{R}$ be the event probability function, which is defined by

$$\mathbf{P}(B) = \sum_{b \in B} p(b).$$

The event probability function $\mathbf{P}$ depends on the set of outcomes A and the distribution p. Sometimes we use notation indicating this dependence and will denote the event probability function by $\mathbf{P}_{A,p}$.

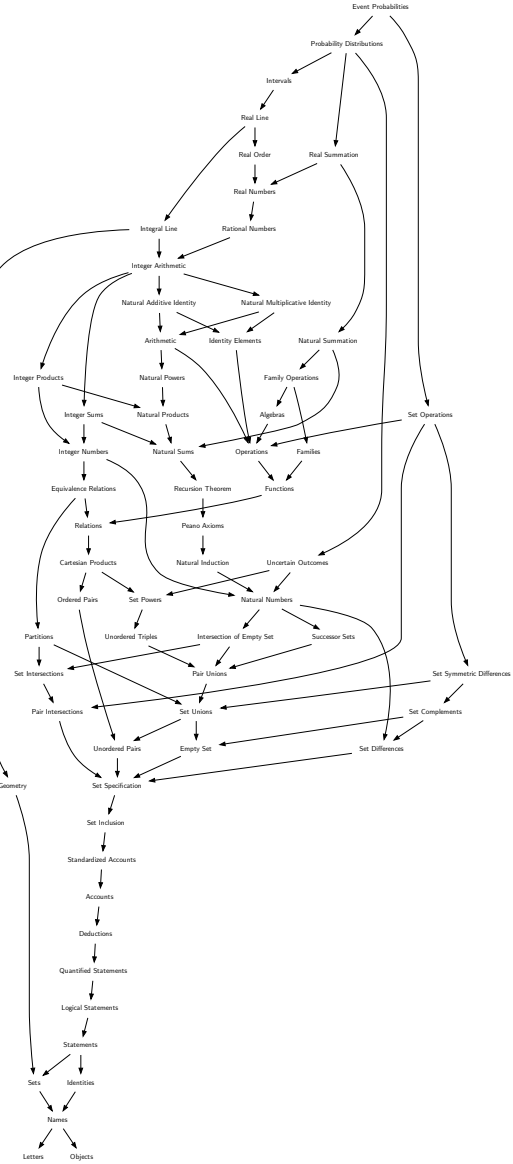
Properties

Prop. 1. *Let* $\mathbf{P}$ *be the event probability function of the distribution* $p : A \to [0, 1]$.

1. $\mathbf{P}(B) \geq 0$ *for all* $B \subset A$

2. $\mathbf{P}(A) = 1$

3. $\mathbf{P}(B \cup C) = \mathbf{P}(B) + \mathbf{P}(C)$ *for* $B, C \subset A$ *and* $B \cap C = \varnothing$


Event Probabilities
Probability Distributions
Intervals
Real Line
Real Order
Real Summation
Real Numbers
Integral Line
Rational Numbers
Integer Arithmetic
Natural Additive Identity
Natural Multiplicative Identity
Arithmetic
Identity Elements
Natural Summation
Integer Products
Natural Powers
Family Operations
Integer Sums
Natural Products
Algebras
Set Operations
Integer Numbers
Natural Sums
Operations
Families
Equivalence Relations
Recursion Theorem
Functions
Relations
Peano Axioms
Cartesian Products
Natural Induction
Uncertain Outcomes
Ordered Pairs
Set Powers
Natural Numbers
Partitions
Unordered Triples
Intersection of Empty Set
Successor Sets
Set Intersections
Pair Unions
Set Symmetric Differences
Pair Intersections
Set Unions
Set Complements
Unordered Pairs
Empty Set
Set Differences
Geometry
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects