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 $\mathsf{P} : 2^A \to \mathsf{R}$ be the event probability function, which is defined by

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

The event probability function P depends on the outcomes A and the distribution p. We sometimes indicate this dependence by writing $\mathsf{P}_{A,p}$.

Properties

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

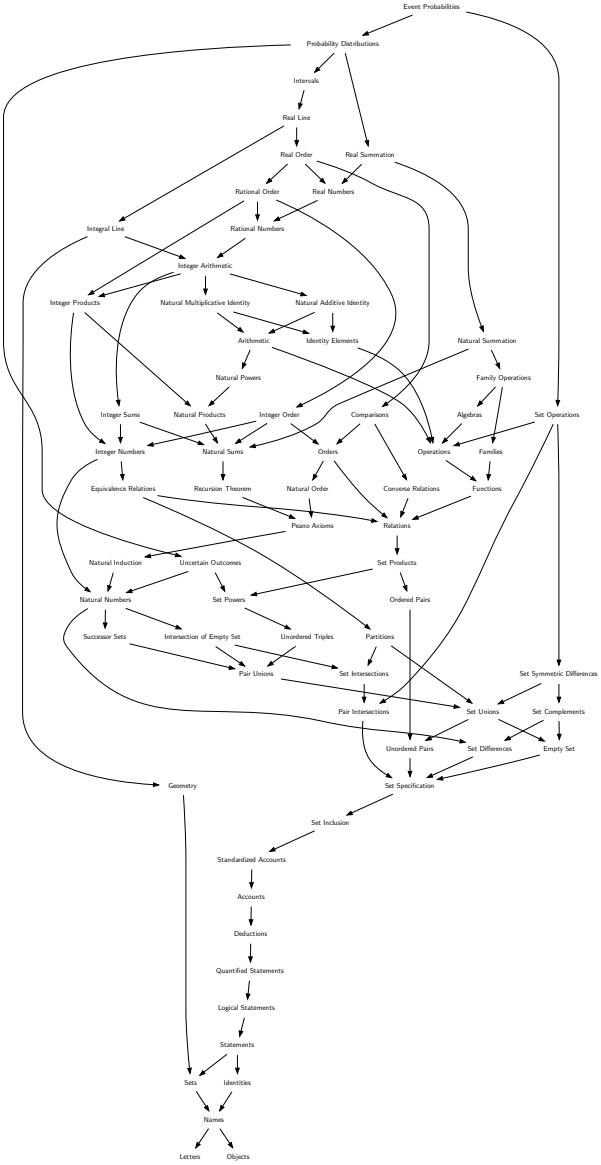
1. $\mathsf{P}(B) \geq 0$ *for all* $B \subset A$

[1] Future editions will include an account.

2. $\mathbf{P}(A) = 1$, *and* $\mathbf{P}(\varnothing) = 0$

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

   (a) *if* $B \cap C = \varnothing$, *then* $\mathbf{P}(B \cup C) = \mathbf{P}(B) + \mathbf{P}(C)$.


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