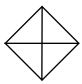


Why

We use the language of measure theory to give a mathematical model for uncertain outcomes. TODO: probability intuition sheet.

Definition

A *probability measure* is a finite measure on a measurable space which assigns the value one to the base set. A finite measure can always be scaled to a probability measure, so these measures are standard examples of finite measures.

A *probability space* is a measure space whose measure is a probability measure. The word "space" is natural, since we developed measure theory partly as a generalization of volume in three-dimensional space (see Real Space and N-Dimensional Space). The *outcomes* of a probability space are the elements of the base set. The *set of outcomes* is the base set. The *events* are the elements of the sigma algebra.

The measure in a probability space corresponds to the event probability function.

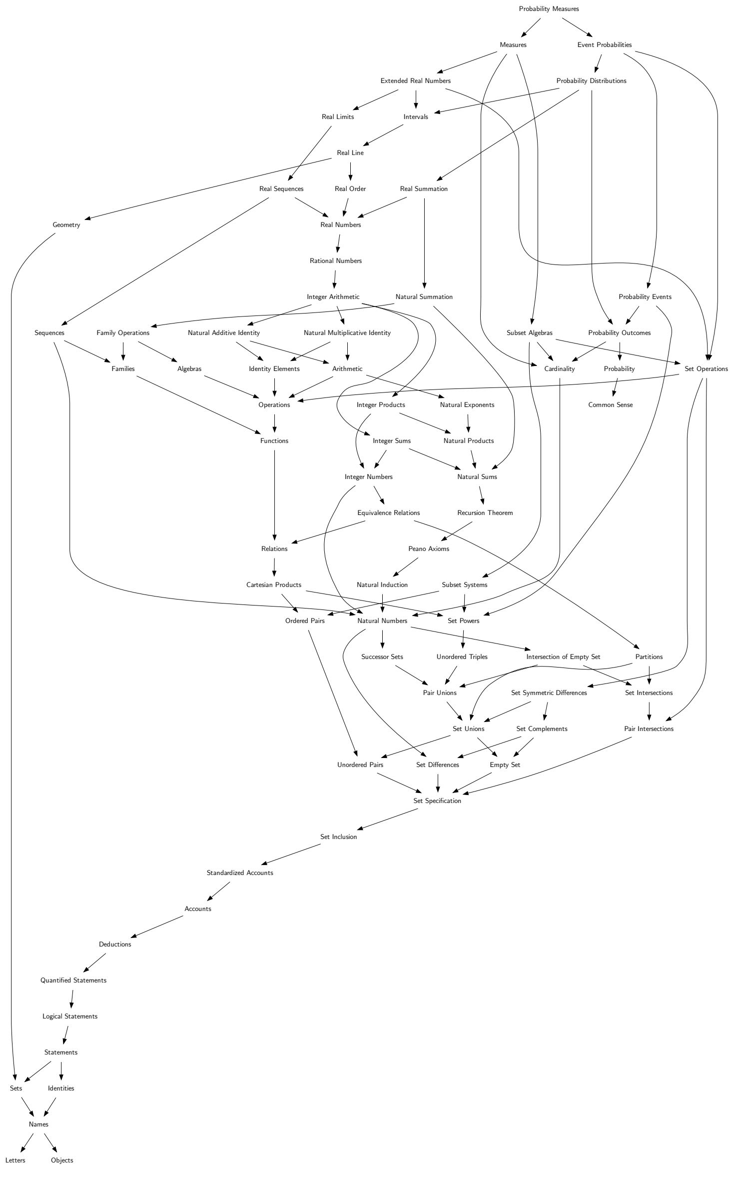
Notation

Let $(A, \mathcal{A})$ be a measurable space.[1] We denote the sigma-algebra by $\mathcal{A}$, as usual. We denote a probability measure by

[1] Often, other authors will denote the set of outcomes (here denoted by A) by Ω, a mnemonic for "outcomes."

$\mathbf{P}$, a mnemonic for "probability," and intended to remind of the event probabilty function. Thus, we often say "Let $(A, \mathcal{A}, \mathbf{P})$ be a probability space."

Properties


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