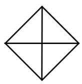


Why

We can generalize random variables and random vectors.

Definition

A *random function* (or *random process*, *stochastic process*[1] or *random field*[2]) is an outcome variable whose codomain is a set of functions.

We can associate a family of random variables to each random function. The index set of the family is the domain of the set of functions and the codomain of each random variable is the codomain of the set of functions. For this reason, some authors define a random function as a family of random variables.

Notation

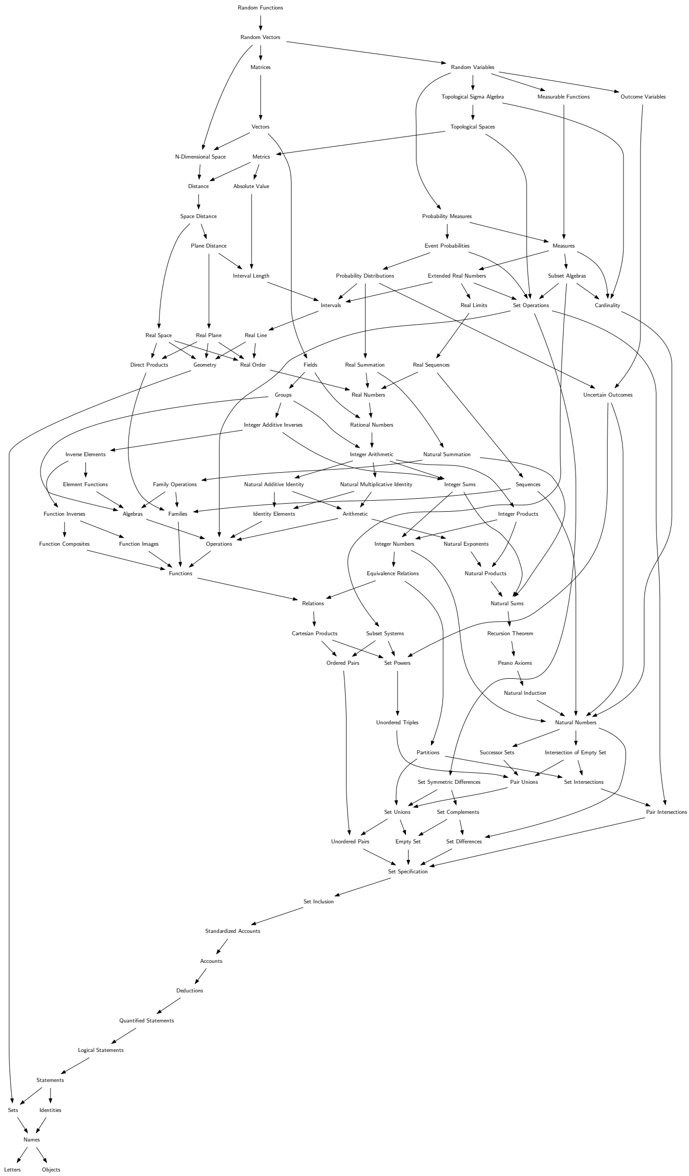
Let $(\Omega, \mathcal{A}, \mathbf{P})$ be a probability space. Let A and B be sets and let $x : \Omega \to (A \to B)$ Then x is a random function. For each outcome $\omega \in \Omega$, $x_\omega : A \to B$ is a function from A to B.

We can associate to x a family of random variables indexed by A, $y : A \to (\Omega \to B)$, defined by

$$y(a)(\omega) = x(\omega)(a)$$

[1] The word "process" is most frequently used when the index set is associated with time.

[2] The word "field" is most frequently used when the index set is associated with space.


Random Functions
Random Vectors
Matrices
Random Variables
Topological Sigma Algebra
Measurable Functions
Outcome Variables
Vectors
Topological Spaces
N-Dimensional Space
Metrics
Distance
Absolute Value
Space Distance
Probability Measures
Plane Distance
Event Probabilities
Measures
Interval Length
Probability Distributions
Extended Real Numbers
Subset Algebras
Intervals
Real Limits
Set Operations
Cardinality
Real Space
Real Plane
Real Line
Direct Products
Geometry
Real Order
Fields
Real Summation
Real Sequences
Groups
Real Numbers
Uncertain Outcomes
Integer Additive Inverses
Rational Numbers
Inverse Elements
Integer Arithmetic
Natural Summation
Element Functions
Family Operations
Natural Additive Identity
Natural Multiplicative Identity
Integer Sums
Sequences
Function Inverses
Algebras
Families
Identity Elements
Arithmetic
Integer Products
Function Composites
Function Images
Operations
Integer Numbers
Natural Exponents
Functions
Equivalence Relations
Natural Products
Relations
Natural Sums
Cartesian Products
Subset Systems
Recursion Theorem
Ordered Pairs
Set Powers
Peano Axioms
Natural Induction
Unordered Triples
Natural Numbers
Partitions
Successor Sets
Intersection of Empty Set
Set Symmetric Differences
Pair Unions
Set Intersections
Set Unions
Set Complements
Pair Intersections
Unordered Pairs
Empty Set
Set Differences
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects