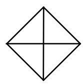


Why

[1]

Definition

A *distribution family* (*density family*) on X is a family of distributions (densities) $\{p^{(\theta)}\}_{\theta \in \Theta}$ on X. We call the index set Θ (see Families) the *parameters*. Frequently $\Theta \subset \mathsf{R}^p$.

Similarly, a *conditional distribution family* (*conditional density family*) on Z from X is a family $\{q^{(\theta)}\}_{\theta \in \Theta}$ whose terms $q^{(\theta)} : Z \times X \to \mathsf{R}$ are such that $q^{(\theta)}(\cdot, \xi) : Z \to \mathsf{R}$ is a distribution (density) for every $\xi \in X$.

Examples

For example, let $\Theta = [0, 1]$ and consider the family of distributions $\{p^{(\theta)} : \{0, 1\} \to [0, 1]\}_{\theta \in [0,1]}$ defined by, for each $\theta \in [0, 1]$,

$$p^{(\theta)}(1) = \theta \text{ and } p^{(\theta)}(0) = 1 - \theta.$$

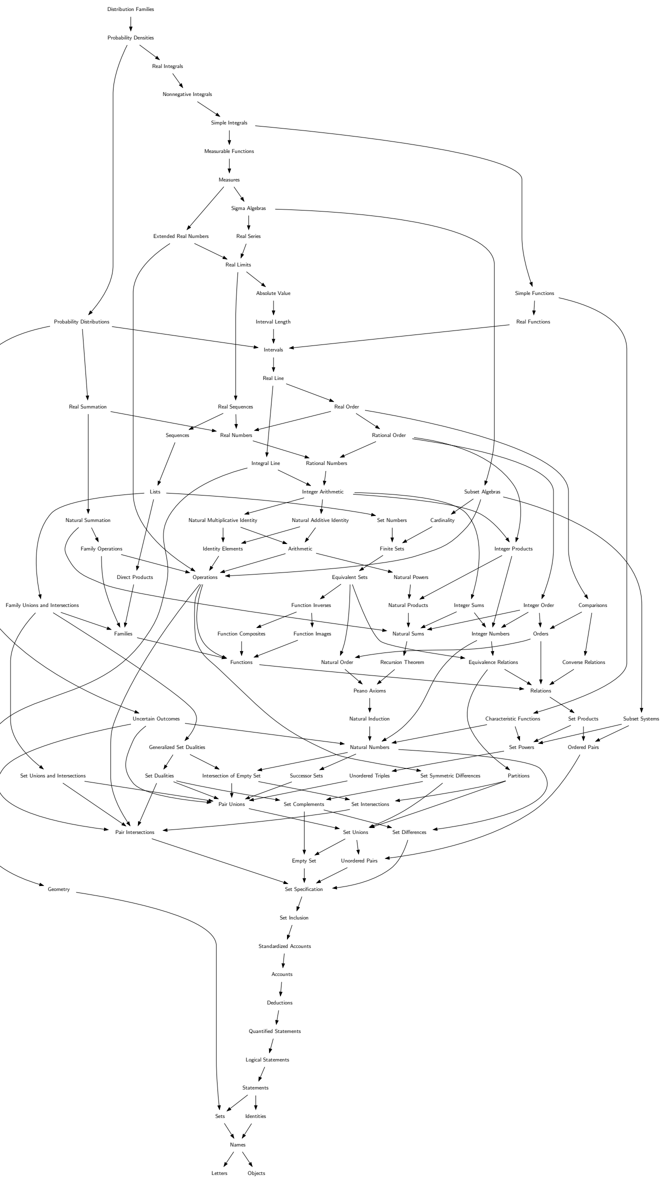
This family is called the *Bernoulli family* and $p^{(\theta)}$ is called a *Bernoulli distribution* with parameter θ.

For a second example, let $\Theta = \mathsf{R} \times \mathsf{R}_+$ and consider the family of densities $\{f^{(\theta)} : \mathsf{R} \to \mathsf{R}\}_{\theta \in \Theta}$ defined by, for each $\theta = (\mu, \sigma) \in \Theta$,

$$f^{(\theta)}(x) = ({}^1/\sqrt{2\pi}\sigma) \exp({}^{(x-\mu)}/\sigma^2).$$

This family is called the *normal family* and $f^{(\theta)}$ with $\theta = (\mu, \sigma)$ is called a *normal density* with mean μ and variance σ^2.

[1] Future editions will include.


Distribution Families
Probability Densities
Real Integrals
Nonnegative Integrals
Simple Integrals
Measurable Functions
Measures
Sigma Algebras
Extended Real Numbers
Real Series
Real Limits
Absolute Value
Simple Functions
Probability Distributions
Interval Length
Real Functions
Intervals
Real Line
Real Summation
Real Sequences
Real Order
Sequences
Real Numbers
Rational Order
Integral Line
Rational Numbers
Lists
Integer Arithmetic
Subset Algebras
Natural Summation
Natural Multiplicative Identity
Natural Additive Identity
Set Numbers
Cardinality
Family Operations
Identity Elements
Arithmetic
Finite Sets
Integer Products
Direct Products
Operations
Equivalent Sets
Natural Powers
Family Unions and Intersections
Function Inverses
Natural Products
Integer Sums
Integer Order
Comparisons
Families
Function Composites
Function Images
Natural Sums
Integer Numbers
Orders
Functions
Natural Order
Recursion Theorem
Equivalence Relations
Converse Relations
Peano Axioms
Relations
Uncertain Outcomes
Natural Induction
Characteristic Functions
Set Products
Subset Systems
Generalized Set Dualities
Natural Numbers
Set Powers
Ordered Pairs
Set Unions and Intersections
Set Dualities
Intersection of Empty Set
Successor Sets
Unordered Triples
Set Symmetric Differences
Partitions
Pair Unions
Set Complements
Set Intersections
Pair Intersections
Set Unions
Set Differences
Empty Set
Unordered Pairs
Geometry
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects