Marginal Distributions

Why

Definition

Consider a joint distribution with n components. We associate with this joint n *marginal distributions*.

For $i = 1, \ldots, n$, the *ith marginal distribution* of the joint is the distribution over the ith set in the product which assigns to each element of that set the sum of probabilities of outcomes whose ith component matches that element.

For $i, j = 1, \ldots, n$ and $i \neq j$, the *i, jth marginal distribution* of the joint is the distribution over the product of the ith and jth sets in the original product which assigns to each element in the product the sum of probabilities of outcomes whose i component matches the first component of the product and whose jth component matches the jth component of the product.

Notation

Let $A_1, \ldots, A_n$ be non-empty finite sets. Define $A = \prod_{i=1}^{n} A_i$ and let $p : A \to \mathbf{R}$ be a joint distribution.

For $i = 1, \ldots, n$, define $p_i : A_i \to \mathbf{R}$ by

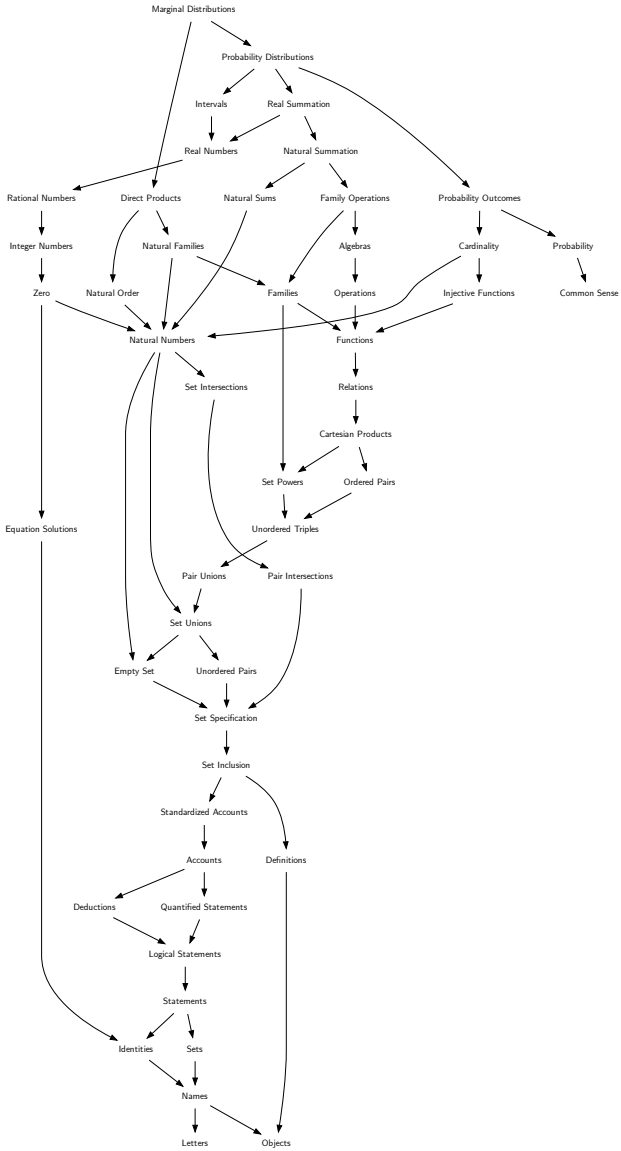
$$p_i(b) = \sum_{a_i = b} p(a).$$

for each $b \in A_i$. p_i is the ith marginal of p.

Similarly, for $i, j = 1, \ldots, n$ and $i \neq j$ define $p_{ij} : A_i \times A_j \to \mathbf{R}$ by

$$p_{ij}(b, c) = \sum_{a_i = b, a_j = c} p(a)$$

for every $b \in A_i$ and $c \in A_j$. Then p_{ij} is the i, jth marginal of p.


Marginal Distributions
Probability Distributions
Intervals
Real Summation
Real Numbers
Natural Summation
Rational Numbers
Direct Products
Natural Sums
Family Operations
Probability Outcomes
Integer Numbers
Natural Families
Algebras
Cardinality
Probability
Zero
Natural Order
Families
Operations
Injective Functions
Common Sense
Natural Numbers
Functions
Set Intersections
Relations
Cartesian Products
Set Powers
Ordered Pairs
Equation Solutions
Unordered Triples
Pair Unions
Pair Intersections
Set Unions
Empty Set
Unordered Pairs
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Definitions
Deductions
Quantified Statements
Logical Statements
Statements
Identities
Sets
Names
Letters
Objects