Definition

Suppose $\mathcal{X}$ is a finite set. A distribution $p : \mathcal{X} \to [0, 1]$ is a *normalized exponential distribution* (also *Gibbs distribution*, *Boltzmann distribution*) if there exists a function $F : \mathcal{X} \to \mathbf{R}$ so that

$$p(x) = \frac{\exp(-F(x))}{\sum_{\xi \in \mathcal{X}} \exp(-F(\xi))} \quad \text{for all } x \in \mathcal{X}$$

The function F is sometimes called the *energy* (or *energy function*) of p.

Normalized Exponential Probability Distributions

Exponential Function · Outcome Probabilities

Real Functions

Intervals

Real Line

Real Order · Real Summation

Rational Order · Real Numbers · Natural Summation

Integral Line · Rational Numbers · Lists

Integer Arithmetic · Natural Fractions · Set Numbers · Direct Products

Integer Products · Natural Additive Identity · Natural Multiplicative Identity · Finite Sets

Identity Elements · Natural Arithmetic · Equivalent Sets

Integer Order · Integer Sums · Natural Powers · Comparisons · Family Operations · Function Inverses · Family Unions and Intersections

Integer Numbers · Natural Products · Orders · Operations · Families · Function Composites · Function Images

Natural Sums · Equivalence Relations · Natural Order · Converse Relations · Functions

Recursion Theorem · Relations

Peano Axioms · Ordered Pair Projections · Uncertain Outcomes

Natural Induction · Set Products

Natural Numbers · Generalized Set Dualities · Set Powers

Set Symmetric Differences · Partitions · Set Dualities · Successor Sets · Intersection of Empty Set · Unordered Triples · Set Unions and Intersections

Set Complements · Set Intersections · Pair Unions · Ordered Pairs

Set Differences · Set Unions · Pair Intersections

Geometry · Empty Set · Unordered Pairs

Set Specification

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Sets · Identities

Names

Letters · Objects

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