Why

We want a density that is symmetric about some center value with some spread.

Definition

Let $f : \mathbf{R} \to \mathbf{R}$ be a density. If there exists $\mu \in \mathbf{R}$ and $\sigma \in \mathbf{R}$ with $\sigma > 0$ so that for each $x \in \mathbf{R}$

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} \exp\left(-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2\right)$$

then f is a *normal density*. A normal density is often called a *Gaussian density*.[1] We often drop the word density and use refer to these as *normals* or *Gaussians*, using these words as substantives.

We call the special case when $\mu = 0$ and $\sigma = 1$ the *standard normal density* or *standard gaussian density*.

Maximum

The maximum of a normal density is μ.

[1] We do not use this term in accordance with the Bourbaki project's policy on historical names.


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