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 $x \in \mathbf{R}$

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

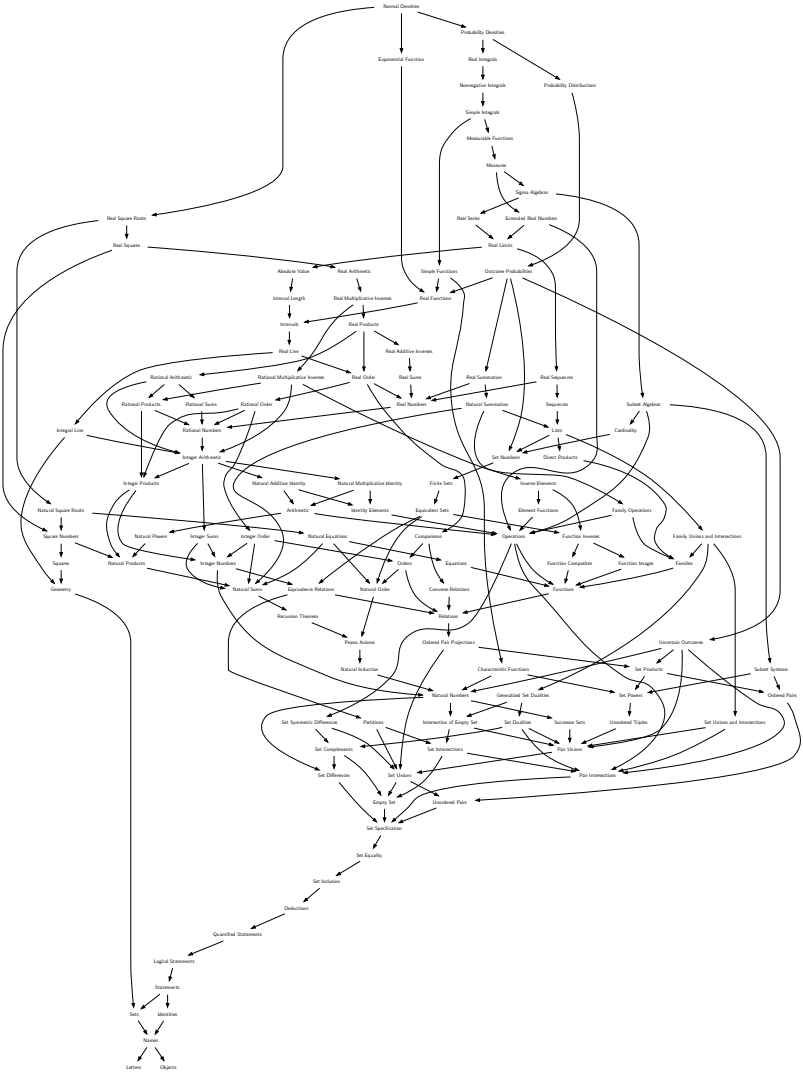
then f is a *normal density*. A normal density is often called a *Gaussian density*.[1] We often drop the word density and use refer to these as *normals* or *Gaussians*, using these words as substantives.

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