Why

We define integrals using an infinite process; in order for each step of the process to make sense, we need functions to be measurable.[1]

Definition

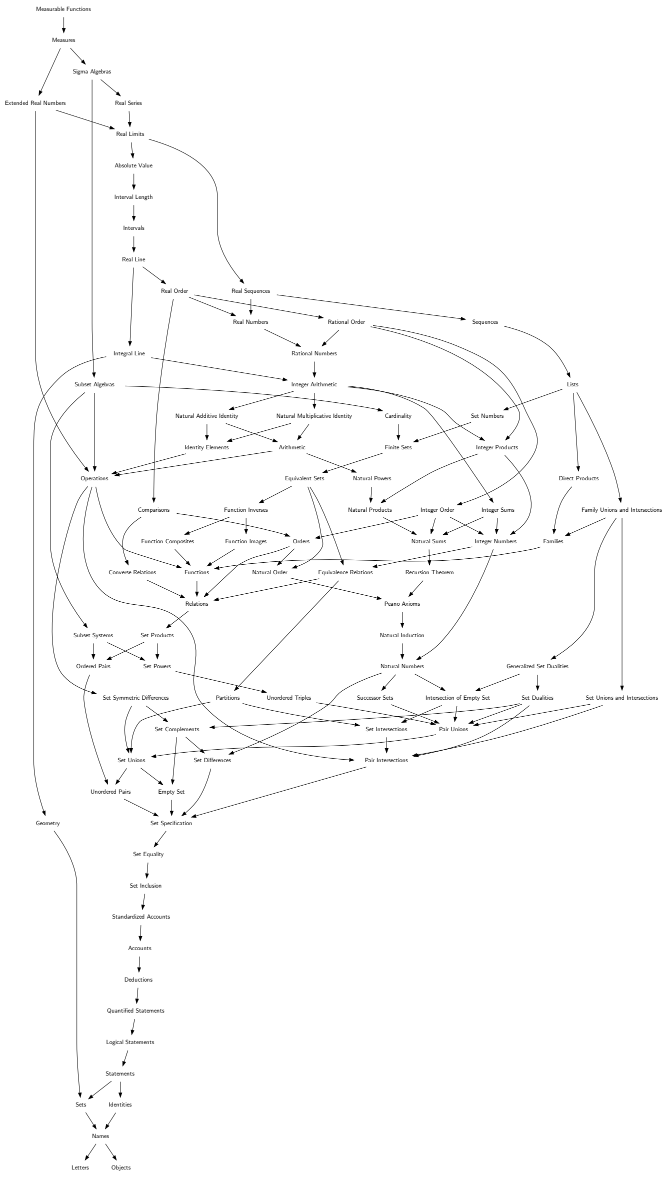
A function between the base sets of two measurable spaces is *measurable* with respect to the distinguished sets of the two spaces if the inverse image of every distinguished subset of the codomain is a distinguished subset of the domain.

Notation

Let $(X, \mathcal{A})$ and $(Y, \mathcal{B})$ be measurable spaces. Then a function $f : X \to Y$ is measurable if $B \in \mathcal{B}$ implies $f^{-1}(B) \in \mathcal{A}$. We say that f is measurable with respect to $\mathcal{A}$ and $\mathcal{B}$.

In this case, we sometimes say f is a measurable function from $(X, \mathcal{A})$ to $(Y, \mathcal{B})$. We say, $f : (X, \mathcal{A}) \to (Y, \mathcal{B})$ is measurable, read aloud as "f from X, A to Y, B is measurable."

[1] This statement contains a forward reference to Real Integrals, and so may be modified in future editions.


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