Why

A vista sheet on exchanging integrals and limits.

Discussion

The monotone convergence theorem and the dominated convergence theorem give conditions under which we can exchange a limit with an integral. Since an integral is a limit, these theorems give conditions under which we can exchange limits.

We remember in exchanging these limits that we are really exchanging infinite processes. It is no suprise that this exchange does not always make sense. Nonetheless, the dominated convergence theorem gives a simple criteria which is easy and guarantees the desired exchange is valid.

TODO: Structure of the theory. Building from the monotone convergence for simple functions through to the dominated convergence.

Real Integral Limit Theorems

Real Integral Dominated Convergence — Real Integral Monotone Convergence

Real Integrals — Absolute Value

Nonnegative Integrals

Simple Integrals — Interval Length

Measurable Functions

Measures

Extended Real Numbers

Real Limits — Intervals

Real Line

Real Sequences — Real Order

Real Numbers

Rational Numbers — Integral Line

Integer Arithmetic

Sequences

Direct Products — Set Numbers — Natural Multiplicative Identity — Natural Additive Identity

Sigma Algebras — Finite Sets — Arithmetic — Identity Elements

Subset Algebras — Equivalent Sets — Natural Exponents — Integer Products

Set Operations — Family Unions and Intersections — Cardinality — Function Inverse — Integer Sums — Natural Products

Families — Function Composites — Function Images — Natural Sums — Operations — Integer Numbers

Natural Order — Functions — Recursion Theorem — Equivalence Relations

Peano Axioms — Relations — Simple Functions

Natural Induction — Characteristic Functions — Cartesian Products — Subset Systems

Generalized Set Dualities — Natural Numbers — Set Powers — Ordered Pairs — Partitions

Set Symmetric Differences — Set Dualities — Set Unions and Intersections — Successor Sets — Intersection of Empty Set

Set Complements — Pair Unions — Set Intersections — Unordered Triples

Set Differences — Pair Intersections — Set Unions

Empty Set — Unordered Pairs

Set Specification — Geometry

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Identities — Sets

Names

Letters — Objects