**Why**

TODO

**Definition**

The *expectation* of a real-valued random variable defined on a probability space is its integral with respect to the probability measure. The expectation of a ranom variable is also called its *mean.*

**Notation**

Let $(X, \mathcal{A}, \mu)$ be a probability space and $f$ be a random variable. We denote the expectation of $f$ by $\mathsf{E} f$. We defined it by

$$\mathsf{E} f = \int f d\mu.$$

Expectation

Random Variables

Measurable Functions

Topological Sigma Algebra

Topological Spaces

Metrics

Distance

Absolute Value

Space Distance

Plane Distance

Interval Length

Probability Measures

Measures

Event Probabilities

Probability Distributions

Probability Events

Extended Real Numbers

Subset Algebras

Intervals

Probability Outcomes

Real Limits

Real Space

Real Plane

Real Line

Probability

Cardinality

Set Operations

Direct Products

Geometry

Real Order

Real Summation

Common Sense

Real Sequences

Real Numbers

Rational Numbers

Integer Arithmetic

Natural Summation

Natural Additive Identity

Natural Multiplicative Identity

Family Operations

Sequences

Arithmetic

Identity Elements

Algebras

Families

Integer Products

Natural Exponents

Operations

Integer Sums

Natural Products

Functions

Integer Numbers

Natural Sums

Equivalence Relations

Recursion Theorem

Peano Axioms

Relations

Natural Induction

Cartesian Products

Subset Systems

Natural Numbers

Set Powers

Ordered Pairs

Partitions

Intersection of Empty Set

Successor Sets

Unordered Triples

Set Intersections

Pair Unions

Set Symmetric Differences

Pair Intersections

Set Unions

Set Complements

Set Differences

Unordered Pairs

Empty Set

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets

Identities

Names

Letters

Objects