Why

We want to talk about several uncertain outcomes at once.

Definition

An *event* (or *compound event, random event*) is a subset of outcomes.

Algebra of events

For events $A, B \subset \Omega$, we interpret $A \cup B$ as the event that either A *or B* occurs. Similarly we interpret $A \cap B$ as the event that *both A and B* occur. We interpret $\Omega - A$, the *complement* of A in Ω, as the event that *A does not* occur.

Examples

An even and odd number of pips. As usual, model a die roll with outcomes $\{1, 2, 3, 4, 5, 6\}$. Model the event that the number of pips is odd with the set $\{1, 3, 5\}$. Similarly, model the event that the number of pips is even with the set $\{2, 4, 6\}$.

Rolling doubles. Suppose we model rolling two dice with the outcome set $\{1, \ldots, 6\}^2$. The event of rolling "doubles"—the two die show the same number of pips—can be modeled as the set D defined by

$$D = \{(1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6)\}.$$

We may model the event that the die turns up four as the set $\{4, 5, 6\}$.

Uncertain Events

Uncertain Outcomes

Set Products

Natural Numbers

Set Powers

Intersection of Empty Set

Successor Sets

Unordered Triples

Set Intersections

Pair Unions

Ordered Pairs

Set Differences

Pair Intersections

Set Unions

Empty Set

Unordered Pairs

Set Specification

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Identities

Sets

Names

Letters

Objects