Probability Axioms

Mathematics

Kolmogorov's three axioms, and the results that follow from them.

Three axioms. Everything else is a theorem.

The axioms

$P(A) \geq 0$ for every event A

$P(\Omega) = 1$ for the sample space Ω

Disjoint A, B: $P(A \cup B) = P(A) + P(B)$

Additivity extends to countable families

Immediate consequences

$P(A') = 1 - P(A)$

$P(\varnothing) = 0$

$A \subseteq B \Rightarrow P(A) \leq P(B)$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$0 \leq P(A) \leq 1$ for every A

$P(A) = 0$ does not mean impossible for a continuous variable: every individual point has probability exactly zero.