Structural properties of algebras of S-probabilities

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Abstract

Let S be a set of states of a physical system. The probabilities $p(s)$ of the occurrence of an event when the system is in different states $s \in S$ define a function from S to $[0, 1]$ called a *numerical event* or, more precisely, an *S-probability*. A set of S-probabilities comprising the constant functions 0 and 1 which is structured by means of the addition and order of real functions in such a way that an orthomodular partially ordered set arises is called an *algebra of S-probabilities*, a structure significant as a quantum-logic with a full set of states. The main goal of this paper is to describe algebraic properties of algebras of S-probabilities through operations with real functions. In particular, we describe lattice characteristics and characterize Boolean features. Moreover, representations by sets are considered and pertinent examples provided.