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A FAMILY OF FINITE DE MORGAN ALGEBRAS

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The algebra of truth values for fuzzy sets of type-2 consists of all mappings from the unit interval $[0,1]$ into itself, with operations certain convolutions of these mappings with respect to pointwise max and min. This algebra has been studied rather extensively in the last few years, both from an applications point of view and a theoretical one. Most of the theory goes through when $[0,1]$ is replaced by any two finite chains, in which case interesting finite algebras arise— De Morgan algebras and Kleene algebras in particular—and a basic question is just where these algebras fit into the world of all such finite algebras. The calculation of their orders is an interesting combinatorial exercise, and leads to other representations of these algebras. In the De Morgan case, the algebras are characterized as those whose poset of join irreducible elements has a particularly simple structure. This leads to the determination of the automorphism groups of these algebras. Similar results are obtained for the Kleene algebras.

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