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The spectrum of idempotent varieties of algebras with binary operators based on two variable identities

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The paper contains a proof of the following theorem.

THEOREM. *Suppose V is a variety of idempotent algebras with binary operators only and based on two-variable identities and which contains a finite algebra of order $k>1$. Then there exist integers $d, a_1, a_2, \ldots, a_r$ such that if v is the order of a finite algebra in the variety then $v \equiv a_1$ or $v \equiv a_2$, or $\cdots$ $v \equiv a_r \pmod d$. Furthermore, there is an integer v_0 such that if $v \geq v_0$ and $v \equiv a_1$, or $v \equiv a_2, \ldots,$ or $v \equiv a_r \pmod d$ then there is an algebra of order v in the variety.*

The theorem has applications to combinatorial designs such as orthogonal latin squares, perpendicular Steiner systems etc. Other applications are to universal algebra itself such as an immediate corollary that Boolean algebras can not be defined by identities using two-variables only.

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Converse theorems for the trapezoidal rule

HELMUT BRASS

Let

$$R_n[f]=\int_0^1 f(x)\,\mathrm{d}x-n^{-1}\{\tfrac{1}{2}f(0)+\sum_{\nu=1}^{n-1} f(\nu n^{-1})+\tfrac{1}{2}f(1)\}$$