Asymptotic enumeration of decomposable structures

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Abstract

The number c_n of weighted partitions of an integer n, with parameters (weights) b_k, $k \geq 1$, is given by the generating function relationship $\sum_{n=0}^{\infty} c_n z^n = \prod_{k=1}^{\infty} (1 - z^k)^{-b_k}$. Meinardus(1954) established his famous asymptotic formula for c_n, as $n \to \infty$, under three conditions on power and Dirichlet generating functions for b_k. We give a probabilistic proof of Meinardus' theorem with weakened third condition and extend the resulting version of the theorem from weighted partitions to other two classic types of decomposable combinatorial structures, which are called assemblies and selections. The probabilistic proof is based on Khintchine type representation of c_n.

This is a joint work with Dudley Stark and Michael Erlihson, published in "Advances in Applied Mathematics, 41, 2008."