ZMATH 2000c.02061

Bressoud, David M.

Proofs and confirmations. The story of the alternating sign matrix conjecture.

Cambridge University Press, Cambridge (ISBN 0-521-66646-5). 289 p. (1999).

This is an introduction to recent developments in algebraic combinatorics and an illustration of how research in mathematics actually progresses. The author recounts the story of the search for and discovery of a proof of a formula conjectured in the early 1980s: the number of n x n alternating sign matrices, objects that generalize permutation matrices. Although it was soon apparent that the conjecture must be true, the proof was elusive. Researchers became drawn to this problem, making connections to aspects of the invariant theory of Jacobi, Sylvester, Cayley, MacMahon, Schur, and Young, to partitions and plane partitions, to symmetric functions, to hypergeometric and basic hypergeometric series, and, finally, to the six-vertex model of statistical mechanics. All these threads are brought together in Zeilberger's 1995 proof of the original conjecture. The book is accessible to anyone with a knowledge of linear algebra. (orig.)

Classification: K25
Keywords: lattice systems; partitions of integers; symmetric functions