Mathematics > Combinatorics

Counting trees using symmetries

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We present a new approach for counting trees, and we apply it to count multitype Cayley trees and to prove the multivariate Lagrange inversion formula. The gist of our approach is to exploit the symmetries of refined enumerative formulas: proving these symmetries is easy, and once the symmetries are proved the formulas follow effortlessly. Somewhat surprisingly, our formula for the generating function of multitype Cayley trees appears to be new, and implies certain recent results by Bousquet-M\'elou and Chapuy. We also adapt our approach to recover known enumerative formulas for cacti counted according to their degree distribution.

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