Pitman, Jim

Forest volume decompositions and Abel-Cayley-Hurwitz multinomial expansions. (English)

A forest $F$ of rooted trees may be associated with a certain product: each vertex $i$ contributes the factor $x_i^{d_i}d_i$ where $x_i$ is a formal variable associated with vertex $i$ and $d_i$ is the number of edges incident with vertex $i$ and leading away from the root of the tree containing $i$ in $F$. A multinomial expression for the sum of the products associated with all forests $F$ with vertex set $S$ and root set $R$, $R \subseteq S$, can readily be deduced from a version of Cayley’s formula or from first principles. By using this result to enumerate forests with various properties, the author develops a number of identities of the Hurwitz and Abel type. Related material appears in the author’s companion paper [Random mappings, forests and subsets associated with Abel-Cayley-Hurwitz multinomial expansions, Sémin. Lothar. Comb. 46, B46h (2001; Zbl 0990.05071)].

Reviewer: J.W.Moon (Edmonton)

MSC:

05A15 Exact enumeration problems, generating functions
05A19 Combinatorial identities, bijective combinatorics
05C05 Trees

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