
Cyclic inclusion-exclusion and the kernel of P -partitions

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Abstract

Following the lead of Stanley and Gessel, we consider a linear map which associates to an acyclic directed graph (or a poset) a quasi-symmetric function. The latter is naturally defined as multivariate generating series of non-decreasing functions on the graph (or of P -partitions of the poset).

We describe the kernel of this linear map, using a simple combinatorial operation that we call cyclic inclusion- exclusion. Our result also holds for the natural non-commutative analog and for the commutative and non-commutative restrictions to bipartite graphs.

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