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The monoid of monotone functions on a poset and quasi-arithmetic multiplicities for uniform matroids. (English) [Zbl 07286488]


Summary: We describe the structure of the monoid of natural-valued monotone functions on an arbitrary poset. For this monoid we provide a presentation, a characterization of prime elements, and a description of its convex hull. We also study the associated monoid ring, proving that it is normal, and thus Cohen-Macaulay. We determine its Cohen-Macaulay type, characterize the Gorenstein property, and provide a Gröbner basis of the defining ideal. Then we apply these results to the monoid of quasi-arithmetic multiplicities on a uniform matroid. Finally we state some conjectures on the number of irreducibles for the monoid of multiplicities on an arbitrary matroid.

MSC:

06A06 Partial orders, general
06A07 Combinatorics of partially ordered sets
05B35 Combinatorial aspects of matroids and geometric lattices

Keywords:

arithmetic matroid; monotone functions; affine monoid; Cohen-Macaulay type; Gorenstein property; irreducible and prime elements

Software:

GAP; Normaliz; NormalizInterface; numericalsgps

Full Text: DOI

References:


[23] Pagaria, R.; Paolini, G., Representations of torsion-free arithmetic matroids


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