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NON-STANDARD APPROACHES TO INTEGER PROGRAMMING

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Abstract

In this survey we address three of the principle algebraic approaches to integer programming. After introducing lattices and basis reduction, we first survey their use in integer programming, presenting among others Lenstra's algorithm that is polynomial in fixed dimension, and the solution of diophanine equations using basis reduction. The second topic concerns augmentation algorithms and test sets, including the role played by Hilbert and Gröbner bases in the development of a primal approach to solve a family of problems for all right-hand sides. Thirdly we survey the group approach of Gomory, showing the importance of subadditivity in integer programming and the generation of valid inequalities, as well the relation to the parametric problem cited above of solving for all right hand sides.

Keywords: Integer Programming, Lattice Basis Reduction, Lenstra's Algorithm, Test Sets, Augmentation Algorithms, Gröbner Basis, Test Sets, Asymptotic Group Problem, Subadditivity, Corner Polyhedron.

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