Variations on the Erdős distinct-sums problem

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Abstract

Let \( \{a_1, ..., a_n\} \) be a set of positive integers with \( a_1 < \ldots < a_n \) such that all \( 2^n \) subset sums are distinct. A famous conjecture by Erdős states that \( a_n > c \cdot 2^n \) for some constant \( c \), while the best result known to date is of the form \( a_n > c \cdot 2^n / \sqrt{n} \). In this talk, we give an overview on the different methods that have been used, during the past years, to provide some nontrivial lower bounds on \( a_n \) (see [2, 3, 4]). Then, inspired by an information-theoretic interpretation, in [1], we extend the study to vector-valued elements \( a_i \in \mathbb{Z}^k \) and we weaken the condition by requiring that only sums corresponding to subsets of size smaller than or equal to \( \lambda n \) be distinct. For this case, we derive lower and upper bounds on the smallest possible value of \( a_n \).

Keywords: Erdős distinct-sums problem, polynomial method, probabilistic method
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References