

On computing sets of integers with maximum number of pairs summing to powers of 2

Max A. Alekseyev, The George Washington University

We address the problem of finding sets of integers of a given size n with the maximum number of pairs of elements summing to powers of 2. Equivalently, this problem can be posed as finding a maximal graph of order n whose vertices are labeled with pairwise distinct integers such that the endpoint labels for each edge sum to a power of 2. We propose an efficient algorithm for testing whether a given graph admits such a labeling, and use it to determine the maximum size of admissible graphs for orders $n \leq 18$. We also identify the minimal forbidden subgraphs of order up to 11, whose presence makes a graph inadmissible.

Keywords: extremal sets, extremal graphs, graph labeling, forbidden subgraphs, algorithm