Food For Thought

Jason O’Neill
UCSD

On the Union of Sets in Extremal Combinatorics

Abstract:
Given $s$ finite sets $A_1, \ldots, A_s$, determining the size of the union of the $s$ sets is an easy problem. Determining the maximum number of size $k$ subsets of an $n$ element set for which there does not exist $s$ sets which union has size $q$ is a very hard problem in general. Many problems in extremal set theory can be restated in this language for particular choices of $s, k, q$. For instance, the case where $s = 2$ is equivalent to the complete intersection theorem, and when $sk = q$, this is equivalent to the Erdős matching conjecture; one of the biggest open problems in the field. This talk is based off a recent paper of Peter Frankl and Andrey Kupavskii.

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