Math Colloquium

THURSDAY, JANUARY 23RD, 11:30 A.M.
SCIENCE CENTER 300

Student Research with Professor Bajnok
Ryan Matzke and Wes Galbraith, Presenters

What can subtractions add to sums?
Béla Bajnok and Ryan Matzke*

The origins of additive combinatorics can be traced back to Cauchy (a.k.a. the pioneer of analysis) who in 1813 determined the minimum possible size $\rho$ of the 2-fold sumset of an $m$-subset of the cyclic group of prime order $p$:

$$\rho(\mathbb{Z}_p, m, 2) = \min\{p, 2m - 1\}.$$  

The full generalization of Cauchy’s result, the minimum size of the $h$-fold sumset of an $m$-subset of any finite abelian group $G$, was unknown for almost 200 years until a group of French mathematicians determined $\rho(G, m, h)$ for arbitrary $G$, $m$, and $h$.

A variation of this famous result considers spans rather than subsets (that is, elements can be added or subtracted). In the present work, the authors aim to find $\rho_\pm(G, m, h)$; in particular, they investigate situations where $\rho_\pm(G, m, h)$ agrees with $\rho(G, m, h)$.

On Minimum Restricted Sumset Size in Finite Abelian Groups

Authors: Bajnok, Bloom, and Galbraith

Presenter: Wes Galbraith

Given a subset $A$ of a finite abelian group $G$, the $h$-fold restricted sumset of $A$ is the set whose elements are sums of exactly $h$ distinct elements of $A$. The minimum $h$ fold restricted sumset size over all $m$-subsets of $G$ is denoted $\rho^r(G, m, h)$. A good upper bound has already been attained on $\rho^r(G, m, h)$ in the case that $G$ is cyclic. In this talk, we define and evaluate the success of a generalization of this upper bound in the case that $G$ is of rank two and $h = 2$.

Lunch will be available for colloquium participants after the talk.

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