Moreira, Richter, Robertson

If $\bar{d}^*(A) > 0$, $\exists$ infinite $B, C \subseteq \mathbb{N}$ s.t. $B + C \subseteq A$?

Note: if $\mathbb{N} = \bigcup_{i=1}^{r} C_i$, one of C_i has this property!

Let D_n be derangements. What is $\sum_{\pi \in D_n} \varepsilon(\pi)$?

Extreme points: The set in $\mathbb{R}^2$ is closed (Not in $\mathbb{R}^3$!)

Density version of ramsey's theorem??

Recall: if $\mathbb{N}^{(2)} = \bigcup_{i=1}^{r} C_i$ then $\exists$ $S \subseteq \mathbb{N}$, $|S| = \infty$ s.t. $S^{(2)}$ is monochrome.

Conjecture: if $A \subset \mathbb{N} \times \mathbb{N} \setminus$ diagonal is symmetric & "large",

then $A \supset B \times B \setminus$ diagonal where B is "large"

Can S always be chosen to be "large"?

(special case of)

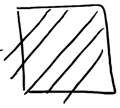
Sárközy: If A is large then $A - A \ni n^3$

Color (a,b) blue if $a - b = n^3$, red o.w.

then S can't be blue by Fermat's last theorem.

and it can't be big & red by Sárközy.

If $\mu(A)=1$, $A \supset B \times B$ with $\mu(B) > 0$?

No: A  (remove rational lines)

$B - B$ contains an interval

Unification of Szemerédi & Sárközy:

if $\bar{d}(A) > 0$, $\exists n$ s.t. $\bar{d}(A \cap (A - n^2)) > 0$

Can be replaced by any $p(n) \in \mathbb{Z}[n]$, $p(0) = 0$.

(in other words, $\{p(n) : n \in \mathbb{N}\}$ is a set of combinatorial recurrence!).

$\bar{d}(A \cap (A-n) \cap \cdots \cap (A-kn)) > 0$

Jake's extension: $\bar{d}(A \cap (A - p(n)) \cap \cdots \cap (A - p(kn))) > 0$

Correct (but still not most general): $\bar{d}(A \cap (A - p_1(n)) \cap \cdots \cap (A - p_k(n))) > 0$

$P - 1$ does not contain IP set <u>but</u> it does contain some $FS(k_i)_{i=1}^{N}$ $\forall N$.

Marriage thm from Pftb

Cayley formula for # trees

finite kakeya problem

How to guard a museum

Milliken-Taylor Theorem (a sort of joint generalization of Ramsey & Hindman)