

# Sum-product and convexity

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## **Abstract**

A recurring theme in number theory is that addition and multiplication do not mix well. A combinatorial take on this theme is the Erdős-Szemerédi sum-product problem which says that a finite set of numbers (in an appropriate field) must either have a large sumset or else a large productset. Depending on the field one is working in, there are different tools which are useful for attacking this problem. Over the real numbers, convexity is one such tool. In this talk, I will discuss the sum-product problem and its variants, and progress that has been made on it. I will then discuss some elementary methods of using convexity to obtain some new results. This will all be based on recent and ongoing work with P. Bradshaw, O. Roche-Newton and M. Rudnev.

**Keywords:** Erdős-Szemerédi, sum-product problem, convexity.