The Dirac-Motzkin Problem on Ordinary Lines and the Orchard Problem*

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Abstract

Suppose you have n points in the plane, not all on a line. A famous theorem of Sylvester-Gallai asserts that there is at least one *ordinary line*, that is to say a line passing through precisely two of the n points. But how many ordinary lines must there be? It turns out that the answer is at least $n/2$ (if n is even) and roughly $3n/4$ (if n is odd), provided that n is sufficiently large. This resolves a conjecture of Dirac and Motzkin from the 1950s. We will also discuss the classical orchard problem, which asks how to arrange n trees so that there are as many triples of colinear trees as possible, but no four in a line. This is joint work with Terence Tao and reports on the results of [1].

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References

1 B. J. Green and T. C. Tao, *On sets with few ordinary lines,* Discrete and Computational Geometry **50** (2013), no. 2, 409–468.

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