Student Research Talks (StReeTs)

Department of Mathematics, George Mason University

An Introduction to the Erdős-Szekeres Problem in Two Dimensions

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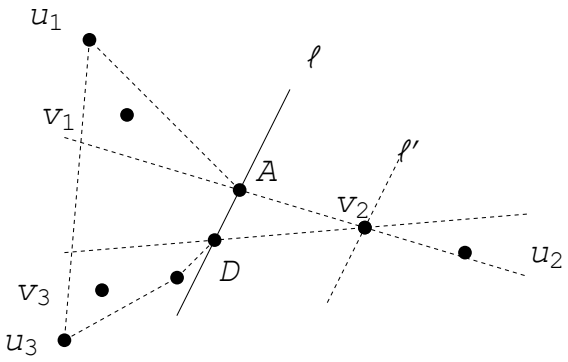

Diagram of a step in the proof of $N(5) = 9$.

Abstract

The Erdős-Szekeres problem is a standard problem introduced in undergraduate graph theory courses and treated in graduate combinatorics courses. Restricted to the plane, the problem asks how many points in the plane (no three on a line) are needed to guarantee that some subset of n points determines a convex n-gon. The problem is considered straightforward to understand, but quickly becomes intractable. In the plane, this question is meaningful when $n \geq 3$, and we will denote this number by either of the equivalent expressions $N(n)$ or $N_2(n)$. By observation, any three points (no three on a line) determine a convex triangle, so $N(3) = 3$. However, the value $N_2(n)$ has been determined with proof only for $n = 3, 4, 5$. This talk will begin with a statement of the problem in two dimensions followed by statements on some known results, upper bounds and proof methods. The main focus of the talk will be a survey of potentially helpful tools to determine further exact results. We will reference some relevant papers to provide context.

Date: Friday April 1, 2022
Time: 2:30pm–3:20pm
Zoom: See https://streets-gmu.wikidot.com for Zoom link or scan below:

For further information, please contact Tracey Oellerich or Aleyah Dawkins via email at `toelleri@gmu.edu` or `adawkin@gmu.edu` by Thursday.