

Problem sheet 6

Problems will be discussed at the problem class on **December 7, 2016**.

Problem 12.

Consider a convex polygon P in the plane and a number t strictly greater than the area of P . For each point $q \notin P$ let $P(q)$ be the polygon $\text{conv}(P \cup \{q\})$.

- a) Prove that the locus L_t of all points q for which the area of $P(q)$ equals t is the boundary of a convex polygon enclosing P .
- b) Prove that if P has n corners, then L_t has between n and $2n$ corners. When does L_t have less than $2n$ corners?

Problem 13.

For every d and r provide a set of $(d+1)(r-1)$ points in \mathbb{R}^d that cannot be partitioned into r subsets with mutually intersecting convex hulls.

Puzzle 6.

What is the smallest k such that there is a room with k straight walls and a light source that leaves either part or all of every wall in shadow?