
4th Problem Set for the MDS Block Course on

High-Dimensional Computational Geometry

Helmut Alt, Wolfgang Mulzer

Summer 2013

The problems will be discussed in the afternoon session.

Problem 1 Area of polygons

Derive the formula given in the course for the area of simple polygons (or at least for convex polygons).

Problem 2 Volume of convex polytopes

The volume of a simplex with vertices $v_0, v_1, \dots, v_d \in \mathbb{R}^d$ is $1/d!$ times (the absolute value of) the determinant of the $d \times d$ -matrix with row vectors $v_i - v_0$, $i = 1, \dots, d$.

Design and analyze (one or more) algorithms for computing the volume of a general convex (V -)polytope in arbitrary dimension d . Your algorithm/s should be as simple as possible, give an exact or approximate result, and you may ignore excessive runtimes.

Problem 3 Reduction of #3SAT to #LEXT

Prove Lemma 1b).