

Homework Assignment #3

Computational Geometry (Winter Term 2013/14)

Exercise 1

Suppose that guards are positioned such that they can see the whole boundary of a polygon. Can they automatically see the whole interior of the polygon as well? [5 points]

Exercise 2

Suppose that a simple polygon with n corners is given, together with a partitioning into sub-polygons by a set of crossing-free diagonals. Prove that the sum of the number of corners of these sub-polygons is $O(n)$. [5 points]

Exercise 3

Suppose that a simple polygon with n corners is given. Give an algorithm that finds a diagonal of this polygon which divides it into two sub-polygons, each with at most $\lfloor 2n/3 \rfloor + 2$ corners, in $O(n \log n)$ time.

Hint: Use the dual graph of a triangulation. (There is a vertex in the dual graph for every triangle in a triangulation. Two vertices are connected by an edge if the corresponding triangles have a common side.) [10 points]

This assignment is due at the beginning of the next lecture, that is, on October 29 at 10:15. Solutions will be discussed in the tutorial on Friday, October 31, 14:00–15:30 in room SE I.