Algorithms Group   **Winter 2022/2023**
Department of Computer Science - IBR
TU Braunschweig

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Computational Geometry
Homework Assignment 2
Jan 12, 2023

Solutions are due on Thursday, the 26th of January 2023, until 15:00 in the homework cupboard. You can also hand in your solution in person before the big tutorial on the 26th begins or via e-mail to `kramer@ibr.cs.tu-bs.de` with CC to `perk@ibr.cs.tu-bs.de`. Please do not email us scanned versions of your handwritten solutions.

We consider all problems in the two-dimensional variant. Please explain your answers in a few sentences. Sometimes it may be helpful to provide us with a drawing.

Exercise 1 (Voronoi Diagrams):

a) What is the farthest points Voronoi diagram?

b) How is the medial axis of a simple polygon related to Voronoi diagrams?

c) What is a Voronoi game?

$$(10 + 10 + 10 = 30 \text{ pts.})$$

Exercise 2 (Trapezoidal Maps):

a) What is a trapezoidal map?

b) Draw three arbitrary segments, their trapezoidal map and its directed acyclic graph.

$$(5 + 20 = 25 \text{ pts.})$$

Exercise 3 (Polygon triangulation (Lecture #10)):

a) Is it possible to construct a polygon that cannot be triangulated?

b) What is your favorite property of a triangulation of a simple polygon? Why?

c) What are the different steps of constructing a triangulation of a simple polygon with n vertices in $O(n \log n)$?

$$(5 + 5 + 10 = 20 \text{ pts.})$$