Homework Exam 1 2023-2024

My name and StudentID go here!

Deadline: 24 November 2023, 13:15

This homework exam has 1 question for a total of 9 points. You can earn an additional point by a careful preparation of your hand-in: using a good layout, good spelling, good figures, no sloppy notation, no statements like "The algorithm runs in $n \log n$." (forgetting the $O(..)$ and forgetting to say that it concerns time), etc. Use lemmas, theorems, and figures where appropriate.

Question 1 (9 points)

Let S be a set of n disjoint line segments in the plane, and let $\mathcal{D} = [x_{\min}, x_{\max}] \times [y_{\min}, y_{\max}]$ be an axis parallel rectangle. You can assume that no two endpoints have the same x-coordinate or the same y-coordinate. Develop an $O(n \log n)$ time algorithm to find a longest horizontal line segment $\overline{ab} \subseteq \mathcal{D}$ whose interior intersects the interior of at most one segment in S. Prove that your algorithm is correct and achieves the desired running time.