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Algorithms Theory
Exercise Sheet 1

Exercise 1: Smallest Triangle *(11 Points)*

In the lecture, we discussed an algorithm to determine the distance between the closest pair of points. We now want to solve the following similar problem: Given a set of points S in the plane, determine the smallest triangle. That is, if for three points a, b, c we define $d(a, b, c) := d(a, b) + d(a, c) + d(b, c)$, we want to compute $\min\{d(a, b, c) \mid a, b, c \in S\}$.
Describe how to adjust the algorithm from the lecture to solve the given problem. Does the runtime change and if yes, how?

Exercise 2: Landau-Notation *(3+3+3 Points)*

Prove or disprove the following statements

(a) $4n^3 + 8n^2 + 5n \in O(2n^3)$.

(b) $2n \in O(10\sqrt{n})$.

(c) $\log_2(2^n \cdot n^3) \in \Theta(5n)$