

Theoretische Informatik (Kernfach) SS 2004
Exercise Set 12**Exercise 1**

Let S be a set of $n \geq 2$ non-crossing segments in the plane. Show that the set $P(S)$ of endpoints of S satisfies

$$2 + \frac{n}{3} \leq |P(S)| \leq 2n .$$

Exercise 2

Let S be a nonempty set of non-crossing segments in general position in the plane, let $s \in S$, and let T be a trapezoid in $\mathcal{T}(S \setminus \{s\}) \setminus \mathcal{T}(S)$. Depending on the number of endpoints of s inside T (0, 1, or 2), investigate how many trapezoids overlapping with T can be created by adding s to $S \setminus \{s\}$.

Exercise 3

We are given a set P of n points in \mathbb{R}^2 and a point q which has distinct distances to all points in P . We add the points of P in random order (starting with the empty set), and observe the nearest neighbor of q in the set of points inserted so far. What is the expected number of distinct nearest neighbors that appear during the process?