Exercise 1

You are given \( n \) axis-parallel rectangles in \( \mathbb{R}^2 \) with their bottom sides lying on the x-axis. Construct their union in \( O(n \log n) \) time.

Exercise 2

Let \( S \) be a set of \( n \) segments that are either horizontal or vertical. Describe an \( O(n \log n) \) time and \( O(n) \) space algorithm that counts the number of pairs in \( \binom{S}{2} \) that intersect.

Exercise 3

What is the algebraic degree of the \texttt{InCircle} predicate? More precisely, you are given three points \( p, q, r \) in the plane that define a circle \( C \) and a fourth point \( s \). You want to know if \( s \) is inside \( C \) or not. What is the degree of the polynomial(s) you need to evaluate to answer this question?