

CSE 521
Assignment 7
Due Tuesday, May 20, 2003

1. In this problem we consider finding all the intersections among a set of circles. Here we are talking about circles, not discs, so that two circles intersect only if their boundaries intersect. Each circle is given by its center and radius. Design a sweep algorithm to report all intersections among a set of n circles. Your algorithm should run in time $O((n + s) \log n)$ where s is the number of intersections. Please provide enough information about your algorithm to verify its correctness and running time.
2. Consider a set of n non-intersecting line segments S each of which has one end on the line $y = 0$ and other end on line $y = 1$. The line segments divide the strip $(-\infty, \infty) \times [0, 1]$ into $n + 1$ regions, where two regions only overlap on a common segment. Show how to build a binary search tree of the regions in $O(n \log n)$ time so that given any query point $q \in (-\infty, \infty) \times [0, 1]$, the region (or boundary of regions) it belongs to can be found in $O(\log n)$ time. Show the search algorithms as well.