Assignment no. 4

due: Jauary 19th, 2004

To be eligible for the full grade in this assignment you need to collect 100 points.

Exercise 4.1 (25 points) Given a star-shaped polygon P with n vertices, show that after $O(n)$ preprocessing time, one can determine whether a query point lies in P in $O(\log n)$ time.

Exercise 4.2 (50 points) Give a randomized algorithm to compute all pairs of intersecting segments in a set of n line segments in expected time $O(n \log n + A)$, where A is the number of intersecting pairs.

Exercise 4.3 (25 points) Let P be a set of n points in the plane. Give an $O(n \log n)$ time algorithm to find for each point p in P another point in P that is closest to p.

Exercise 4.4 (50 points) Give an efficient algorithm to compute the *medial axis* of a convex polygon.