Spring 1996 **CMSC 754: Homework 2** Samir Khuller

Due in class: Feb 28.

Read Chapter 2 of the text (O'Rourke).

(1) Given n points in the plane, construct a simple polygon having them as its vertices. Devise an $O(n \log n)$ algorithm and show that it is optimal. (Hint: recall Graham's scan.)

(2) Given n infinite straight lines in the plane, no two of which are parallel, devise an algorithm to compute the convex hull of all $O(n^2)$ of their intersection points. Your algorithm should run in time $O(n \log n)$. (You should be able to do this without computing all the intersection points.)

(3) Given a simple polygon (no holes) P and two points s and t in the polygon. Give a fast algorithm to compute the shortest path from s to t. (Hint: first triangulate the polygon. You may also want to think about the "structure" of a shortest path between two points in the polygon.)

(4) Extend the linear time triangulation algorithm to monotone polygons.(In class, we studied the algorithm for strictly monotone polygons only.) Your algorithm should run in linear time!