CISC-868 FALL 2011

HOMEWORK 10

Please read chapter 9 of Mark de Berg, Otfried Cheong, Marc van Kreveld, and Mark Overmars Computational Geometry:Algorithms and Applications. You can obtain this chapter online for free from the Queen's University Library QCAT, or from the authors at http://www.cs.uu.nl/geobook/

Exercise 9.9: The algorithm given in this chapter is randomized, and it computes the Delaunay triangulation of a set of n points in $O(n \log n)$ expected time. Show that the worst case running time of the algorithm is at least $\Omega(n^2)$.

Exercise 9.11: A Euclidean minimum spanning tree (EMST) of a set P of points in the plane is a tree of minimum total edge length connecting all the points. EMSTs are interesting in applications where we want to connect sites in a planar environment by communication lines (local area networks), roads, railroads, or the like.

a. Prove that the set of edges of a Delaunay triangulation of P contains an EMST for P.

b. Use this result to give an $O(n \log n)$ algorithm to compute an EMST for P.