CISC-868 FALL 2011

HOMEWORK 4

These questions come from *Discrete and Computational Geometry* by Satyan Devadoss and Joseph O' Rourke.

Exercise 3.2: Show that the edges of the convex hull of a point set S will be in every triangulation of S.

Exercise 3.3: The definition of a triangulation of a point set does not even mention "triangles". Show that all the regions of the subdivision inside the convex hull must indeed be triangles.

Exercise 3.5: Analyze the time complexity of the triangle-splitting algorithm.

Exercise 3.7: Prove or disprove: The triangle-splitting algorithm produces all possible triangulations of a point set.

Exercise 3.8: Analyze the time complexity of the incremental algorithm.

Exercise 3.10: Prove or disprove: The incremental algorithm produces all possible triangulations of a point set S, assuming all possible rotations of S.

Exercise 3.14: Show that every triangulation has some vertex of degree at most five.

Exercise 3.18: Consider the point set S given in Figure 3.5. It is made of two double chains of points, where every pair of points from different chains is visible to each other. Show that the edges drawn in the figure appear in every triangulation of S. Moreover, if there are n points in each chain, find the number of triangulations of S.

Exercise 3.24: Prove or disprove: no point set can have a triangle as a subgraph of its flip graph, that is, three nodes connected in a cycle by three arcs.