

## CISC-868 FALL 2011

### HOMEWORK 6

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

**Exercise 3.67:** Find an algorithm which constructs a pointed pseudotriangulations for a given point set.

**Exercise 3.68:** For any point set, show that pointed pseudotriangulations have the least number of edges over all pseudotriangulations of the point set.

**Exercise 4.4:** Construct a point set with three sites whose Voronoi vertex is exterior to the triangle determined by the sites.

**Exercise 4.7:** Let  $S$  contain the sites  $(1,3),(1,9),(1,11),(3,6),(4,9),(6,6)$ . Draw the Voronoi diagram of  $S$ .

**Exercise 4.14:** For any point set  $S$ , prove that  $\text{Vor}(p)$  is an unbounded region in the plane if and only if  $p$  is on the hull of  $S$ .

**Exercise 4.16:** We claimed above that the changes to the Voronoi diagram are local. Construct an example (for arbitrary  $n$ ) in which every Voronoi region is altered by the addition of a new site, thus showing that the algorithm might need quadratic time in  $n$ .

**Exercise 4.19:** Detail the geometric properties of a one-dimensional Voronoi diagram:  $n$  sites on a line. Design an algorithm to compute it and analyze its computational complexity.