You can discuss problems 1 and 3 with other students, but you must write solutions on your own. This homework is due on Thursday, February 19.

**Problem 1.** Let $P$ be a set of points in the plane, and $D$ be the Voronoi diagram of $P$. Suppose that $D$ has $k$ vertices with degrees $d_1, \ldots, d_k$. How many Delaunay triangulations for $P$ are there? (Hint: use Catalan numbers in your solution.)

**Problem 2.** (Solve this problem on your own.)

1. Let $S$ be a set of points in the plane, and $DG$ be a Delaunay triangulation for $S$. Consider a site $p \in S$ and let $p'$ be the site in $S \setminus \{p\}$ closest to $p$. Prove that $p$ and $p'$ are adjacent in $DG$.

2. Solve problem 9.11 from the textbook.

**Problem 3.** Suppose we are given the Voronoi diagram of a set $P$ of $n$ points in the plane, but we are not given the set $P$ itself. Describe an algorithm to reconstruct the point set $P$ from its Voronoi diagram in $O(n)$ time. Assume that every Voronoi vertex has degree 3. If there is more than one point set consistent with the given diagram, return one (arbitrary) such set.