CSCI5010 Exercise List 11

Problem 1 (All Nearest Neighbor). Let P be a set of n points in $\mathbb{R}^2$. Give an $O(n \log n)$ time algorithm to find, for each point $p \in P$, the point in $P \setminus \{p\}$ closest to p.

Problem 2. Let P be a set of points in $\mathbb{R}^2$. Consider an arbitrary point $p \in P$. Prove that the point $p' \in P \setminus \{p\}$ nearest to p is a neighbor of p in the Voronoi diagram of P (namely, the cell of p' is adjacent to that of p).

Problem 3 (Restoring Sites from a Voronoi Diagram). Suppose that we are given a planar subdivision of n faces which we know is the voronoi diagram of a set P of points. Give an algorithm to restore all the points in P in $O(n)$ time. Sometimes more than one set of points can be returned as P, in which case you can return any such set.