1. Given a set of points $S$ in 2-dimensions, and given that we know an estimate of $\delta$ for the closest distance between pair of points in $S$, show how to determine the set of all points $S$ that are within a distance of $\delta$ from a given point $p \in S$. Show that this can be done for all points $p \in S$ in $O(n \log n)$ time by considering the points in $S$ in sorted $x$-order.

2. PhD Qualifying Exam Section Problem 15. Given $n$ points in the plane, we want to construct a simple polygon having them as vertices.
   
   (a) Prove that $\Omega(n \log n)$ is a lower bound on any algorithm for this problem.
   
   (b) Design an $O(n \log n)$ to solve the problem. (Hint: Modify GRAHAM-SCAN on page 1031 of CLRS3.)