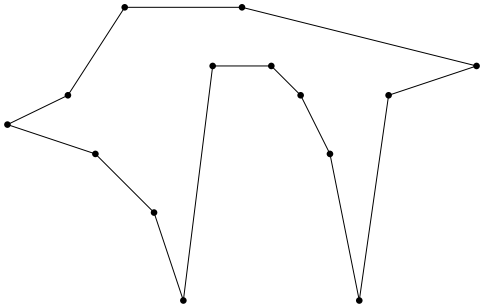
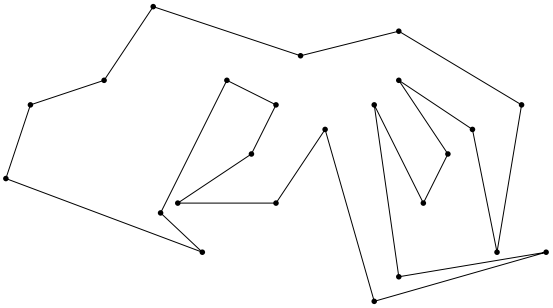
Exercise List 5

Problem 1. On the polygon below, show the diagonals computed by the algorithm we discussed in the lecture for triangulating an x-monotone polygon.



Problem 2. Consider the polygon below. Suppose that we partition it into x-monotone polygons by adding diagonals, using the algorithm discussed in the lecture. Show the diagonals obtained.



Problem 3. Let G be a polygon (which may not necessarily be convex; e.g., the polygon in Problem 2 is a legal input), and P be a set of points, all in $\mathbb{R}^2$. The vertices of G are given in an array in clockwise order. Design an algorithm to label, for each point $p \in P$, whether p is covered by G. Your algorithm must finish in $O(n \log n + m \log m)$ time, where n is the number of vertices in G, and m is the number of points in P.

Problem 4. You are given a polygon G, and a triangle T. Describe an algorithm to find the portion of T that is covered by G. Your algorithm must finish in $O(n)$ time, where n is the number of vertices in G. You can use the fact that G can be triangulated in $O(n)$ time.

For example, in the example below, you should output the three gray polygons. For each polygon, output its vertices in clockwise order.