ASSIGNMENT 2

1. For a polygon $P$ and a point $q$ in $P$, the visibility polygon of $q$ in $P$ is the set of points $p$ in $P$ that are visible from $q$—i.e. the line segment $pq$ lies inside $P$. Give an $O(n)$ time algorithm to find the visibility polygon of a point $q$ in a polygon $P$, assuming that a triangulation of $P$ is given.

2. Show that any polygon on $n$ vertices has a chord that splits it into two polygons each with at most $\lceil 2n/3 \rceil + 2$ vertices. Hint: use a triangulation. Can you guarantee a more even split? Explain.

3. It is an open problem to generate a random simple polygon with $n$ vertices in the $[1..n] \times [1..n]$ grid in polynomial time. Why don’t the following work?
   (a) Generate $n$ points in the grid at random. Connect them in random order. If the result is not simple, start over.
   (b) Generate $n$ points in the grid at random. Following the idea of Graham’s convex hull algorithm, pick a point $X$ inside their convex hull, sort the points radially around $X$, and join them in that order to form a polygon.