CSc 437
Homework #6
Due 12/7/11

Instructions. All assignments are to be completed on separate paper. Use only one side of the paper. Assignments will be due at the beginning of class, or via email. To receive full credit, you must show all of your work.

Unless otherwise specified, all questions are taken from the textbook (second edition)

All lines discussed in this homework are non-vertical.

1. Draw the region $A \oplus B$ (that is, the Minkovski sum of A and B) where
   - A is a disk and B is a disk.
   - A is a disk and B is a polygonal path.
2. Let $R_1 \dots R_n$ be a set of axis-parallel rectangles, given to you by the coordinates of their vertices. Suggest an algorithm that computes in $O(n)$ the region $R_1 \oplus R_2 \oplus R_3 \dots \oplus R_n$.
3. Suggest an algorithm for computing the the region $D \oplus P$, where D is a given disk, and P is a convex polygon with n vertices.
4. Given a set of polygonal regions called the obstacles P gives as a set of (not necessarily convex nor connected) polygons with a total of m edges, and a polygonal convex robot R with n edges, and an initial position s and destination position t of the robot, compute the shortest path of the robot from s to t, without rotating the robot and without intersecting any obstacles. Your algorithm should be as efficient as possible. What is the running time ?
5. 14.4
6. 14.5 (compressed Quadtree)
7. (graduates students only) 14.6
8. 14.7
9. 14.8