

**Assignment no. 4**

due: June 7th, 2010

Please submit each exercise on a separate sheet (or sheets), with your name and student id number on it.

**Exercise 4.1** Let  $P$  be a set of  $n$  points in the plane. Give an  $O(n \log n)$  time algorithm to find for each point  $p$  in  $P$  another point in  $P$  that is closest to  $p$ .

**Exercise 4.2** Give an efficient algorithm to compute the *medial axis* of a convex polygon.

**Exercise 4.3** Let  $L$  be a set of lines in the plane. Give an  $O(n \log n)$  time algorithm to compute an axis-parallel rectangle that contains all the vertices of the arrangement  $\mathcal{A}(L)$  in its interior.

**Exercise 4.4** Let  $S$  be a set of  $n$  segments in the plane. A line  $\ell$  that intersects all segments of  $S$  is called a *transversal* or *stabber* for  $S$ .

(a) Give an  $O(n^2)$  algorithm to decide if a stabber exists for  $S$ .

(b) Now assume that all segments in  $S$  are vertical. Give a linear time algorithm to decide if a stabber for  $S$  exists.

(CGAA Ex. 8.16)