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# Computational Geometry — Homework 4 — HS09

URL: http://www.ti.inf.ethz.ch/ew/courses/CG09/

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## Exercise 1 (10 points)

Prove that the problem of finding a largest disk inside a convex polygon can be formulated as a linear program! What is the number of variables in your linear program?

## Exercise 2 (10 points)

In order to adapt Seidel's randomized linear programming algorithm to the problem of computing smallest enclosing balls, we need the following statements.

(i) Let $P, R \subseteq \mathbb{R}^d, P \cap R = \emptyset$. If there exists a ball that contains $P$ and has $R$ on the boundary, then there is also a unique smallest such ball which we denote by $B(P, R)$.

(ii) Let $P, R \subseteq \mathbb{R}^d, P \cap R = \emptyset$. If $B(P, R)$ exists and $p \in P$ satisfies $p \notin B(P \setminus \{p\}, R)$, then $p$ is on the boundary of $B(P, R)$, meaning that $B(P, R) = B(P \setminus \{p\}, R \cup \{p\})$.

Prove these two statements!

## Exercise 3 (30 points)

Prepare to present either the subject you chose in Homework 1 or the one in Homework 3 in short presentation during the exercise session on December 10th. The presentation should last between 5 and 7 minutes. Please discuss your preference with the teaching assistant before making your definite choice in order to avoid too many students talking about the same subject.

**Due date:** 10.12.2008, 13h00