Spring Semester 2005

# Topics in Computation Theory (CS700)

## Discrete Geometry

## Homework 3

This homework is due on *Wednesday* **April 6**, at the beginning of the (extra) class at 4:00 p.m.

On the top of the first sheet that you turn in, please put (a) your name and student number, (b) how much time you spent working on the homework, and (c) a little table with your self-evaluation as explained on the course webpage.

1. Let $C \subseteq \mathbb{R}^d$ be a convex set. Prove that $C^*$ is bounded if and only if 0 lies in the interior of $C$.

2. Show that $C = C^*$ if and only if $C$ is the unit ball centered at the origin.

3. Show that if $C = \bigcap_{h \in H} h^-$, where $H$ is a collection of hyperplanes not passing through 0, and $C$ is bounded, then $C^* = \text{conv}\{\mathcal{D}_0(h) \mid h \in H\}$.