Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Polyhedral Computation, Spring 2014
Assignment 2*

March 11, 2014

Problem 1 (Farkas Lemma): Prove Farkas' lemma using Gale's theorem.

Problem 2 (Helly's Theorem): Complete the proof of Helly's Theorem (Theorem 3.8). **Caution**: There is a typo in the lecture notes, in the proof of Helly's theorem it should say "S_i" instead of "S_j".

Problem 3 (Minkowski-Weyl's Theorem for Polyhedra): Derive Theorem 3.9 from Theorem 3.10.

Problem 4 (Pointed Cone): Complete the proof of Corollary 3.13, namely prove that if P is a pointed cone $\{x : Ax \leq \mathbf{0}\}$, then there exists a vector c such that $c^T x > 0$ for all nonzero $x \in P$.

Problem 5 (Hilbert Basis): Show that if a rational cone is not pointed, a minimal integral Hilbert basis is not unique.

*Please hand in your solution to May Szedlák CAB G19.2 (may.szedlak@inf.ethz.ch) no later than **Tuesday, March 25, 2014**.