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Advanced Algorithms
WS 2016/17
Homework 7

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Exercise 1:

Show that any linear program can be transformed into an equivalent linear program which is in canonical form and in standard form, respectively. What is the effect to the size of the linear program?

Exercise 2:

Prove the convexity of closed half-spaces and of the intersection of convex sets.

Exercise 3:

Show that $S_a \in \mathbb{R}^n$ is affine iff for any $x, y \in S_a$ and any $-\infty < \lambda < \infty$ always $z := \lambda x + (1 - \lambda)y \in S_a$.

Exercise 4:

Let P be a polytope. Prove that each point $x \in P$ is a convex combination of the vertices of P. (Hint: Prove first the assertion for all vertices, then for each point on an edge, then for all points on a facet, and finally, for each point in the interior of P.)