

Exercise 4: LP & CO

1. Let T be the triangle defined as the convex hull of points $(0, 1)$, $(-1, -1)$, and $(1, -1)$ and let $c \in \mathbb{R} \times \mathbb{R}$.
 - a. Describe T as intersection of finitely many halfspaces. That is, give the linear inequalities describing the halfspaces.
 - b. Convert $\max c^\top x$ s.t. $x \in T$ into a linear program in equational form.
 - c. List any three basic feasible solutions together with a proof of correctness.
 - d. List all basic feasible solutions of the resulting LP.
2. Let P be the convex hull of points $(0, 0, 0)$, $(1, 1, 1)$, $(1, 2, 1)$, $(2, 1, 1)$ and $(2, 2, 1)$ and let $c \in \mathbb{R}^4$.
 - a. Describe P as intersection of finitely many halfspaces. That is, give the linear inequalities describing the halfspaces.
 - b. Convert $\max c^\top x$ s.t. $x \in P$ into a linear program in equational form.
 - c. List all basic feasible solutions. (If you are unable to list all of them, list as many as you can.)
 - d. Prove that your list is complete.