Module 2 test Lin Opt, 201300057

jan 18, 2016,

Name + studentnumber:

Motivate your answers.

1. Consider the problem of minimizing $c^T x$ over some polyhedron $P \subseteq \mathbb{R}^n$. Show that $x \in P$ is an optimal solution if and only if $c^T d \geq 0$ for all feasible directions d at x.

2. Solve by Simplex Method:

$$\begin{array}{llllll} \min & -x_1 & -x_2 & -2x_3 & & \\ \text{s.t.} & & x_2 & +2x_3 & \leq 3 \\ & -x_1 & & +3x_3 & \leq 2 \\ & 2x_1 & +x_2 & +x_3 & \leq 1 \\ & & x \geq 0 & & \end{array}$$

3. Let $A \in \mathbb{R}^{m \times n}$. Show that we can exhibit a solution x of $Ax \leq 0$, $x \geq 0$ with a maximum number of strictly positive coordinates x_i by solving

$$\begin{array}{ll} \max & \sum y_i \\ \text{s.t.} & A(z+y) \leq 0 \\ & y_i \leq 1 \quad \text{for all} \quad i = 1, \ldots, n \\ & z, y \geq 0 \end{array}$$

exercise	1	2	3
points	5	8	5