Module 2 test Lin Opt, 201300057

04-12-2015,

Name + studentnumber:

Motivate your answers.

1. A farmer has 10 acres to plant in wheat (tarwe) and rye (rogge). He has to plant at least 7 acres. However, he has only \$1200 to spend and each acre of wheat costs \$200 to plant and each acre of rye costs \$100 to plant. Moreover, the farmer has to get the planting done in 12 hours and it takes an hour to plant an acre of wheat and 2 hours to plant an acre of rye. If the profit is \$500 per acre of wheat and \$300 per acre of rye how many acres of each should be planted to maximize profits.

2. Transform

   $\min c^T x$

   $$\begin{array}{rrrrl} 2x_1 & - x_2 & + 2x_3 & + x_4 & \geq 5 \\ 5x_1 & + 3x_2 & - 6x_3 & + 8\, x_4 & \leq 7 \\ 6x_1 & -x_2 & -x_3 & -x_4 & = 9 \\ x_1, & x_2, & x_3 & & \geq 0 \end{array}$$

   into standard form.

3. Give the definition of "S is convex" for $S \subseteq \mathbb{R}^n$.
   Give the definition of "L is a line" (affine subspace of dimension 1) for $L \subseteq \mathbb{R}^n$.
   Show that the following two statements are equivalent:
   (i) S is convex.
   (ii) $S \cap L$ is convex for any line $L \subseteq \mathbb{R}^n$.

   Do (i) and (ii) above remain equivalent if we replace "is convex" by "is a polyhedron"?

exercise	1	2	3
points	6	6	6