Příprava na cvičení N 12.

N 15.2 $c_1, \dots, c_n \in \mathbb{R}$ $\max \sum_{i=1}^{n} c_i x_i$ za podmínek $-1 \leq x_i \leq 1$

a) pro $c_i > 0$: $x_i = 1$ Optimální hodnota je $\|c\|_1$
pro $c_i = 0$: x_i libovolné
pro $c_i < 0$: $x_i = -1$

b) $\max c^T x$

$$\begin{bmatrix} x \end{bmatrix} \begin{matrix} \geq -1 \\ \leq 1 \end{matrix}$$

$$A\begin{bmatrix} x \end{bmatrix} \begin{matrix} = \\ \leq \\ \geq \end{matrix} \begin{bmatrix} -1 \\ \vdots \\ \ \end{bmatrix}$$

$\min \left\{ \sum_{i=1}^{n} (u_i + v_i) \;\middle|\; u_i, v_i \geq 0 ;\ v_i - u_i = c_i \right\}$

c) $x_i = -1$ nebo $u_i = 0$
$x_i = 1$ nebo $v_i = 0$

d) primární: $x = (-1, 1, 1)$
duální: $y = (0, 3, 4)$
$z = (-2, 0, 0)$

N 15.3 a)

$$\begin{aligned} \min\ & 2x_1 - 3x_3 + x_4 \\ \text{z. p.}\ & x_1 - x_2 - x_3 \geq 0 \\ & -x_1 + 2x_2 - 3x_3 \leq 5 \\ & 2x_1 - x_2 - x_3 + 2x_4 = 6 \\ & x_1 \geq 0 \\ & x_2 \geq 0 \\ & x_3 \geq 0 \\ & x_4 \geq 0 \end{aligned}$$

$$\begin{aligned} \max\ & 5y_2 + 6y_3 \\ \text{z. p.}\ & y_1 \geq 0 \\ & y_2 \leq 0 \\ & y_3 \in \mathbb{R} \\ & y_1 - y_2 + 2y_3 \leq 2 \\ & -y_1 + 2y_2 - y_3 \leq 0 \\ & -y_1 - 3y_2 - y_3 \leq -3 \\ & 2y_3 \leq 1 \end{aligned}$$

podmínky komplementarity:

$$\begin{aligned} & y_1(x_1 - x_2 - x_3) = 0 \\ & y_2(-x_1 + 2x_2 - 3x_3 - 5) = 0 \\ & x_1(y_1 - y_2 + 2y_3 - 2) = 0 \\ & x_2(-y_1 + 2y_2 - y_3) = 0 \\ & x_3(-y_1 - 3y_2 - y_3 + 3) = 0 \\ & x_4(2y_3 - 1) = 0 \end{aligned}$$

b) $\min_{x \in \mathbb{R}} \max_{i=1}^{n} |a_i - x|$

$\min \{ z \mid z \in \mathbb{R}, x \in \mathbb{R}; z \geq a_i - x,\ z \geq x - a_i \}$

$$\begin{aligned} \min\ & z \\ \text{z. p.}\ & \begin{bmatrix} 1 & 1 \\ \vdots & \vdots \\ 1 & 1 \\ 1 & -1 \\ \vdots & \vdots \\ 1 & -1 \end{bmatrix} \begin{bmatrix} x \\ z \end{bmatrix} \geq \begin{bmatrix} a_1 \\ \vdots \\ a_n \\ -a_1 \\ \vdots \\ -a_n \end{bmatrix} \\ & z \in \mathbb{R} \\ & x \in \mathbb{R} \end{aligned}$$

$$\begin{aligned} \max\ & a^T u - a^T v \\ \text{z. p.}\ & u \geq 0 \\ & v \geq 0 \end{aligned}$$

$$\begin{bmatrix} 1 & \cdots & 1 & 1 & \cdots & 1 \\ 1 & \cdots & 1 & -1 & \cdots & -1 \end{bmatrix} \begin{bmatrix} u \\ v \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

podmínky komplementarity $z = a_i - x$ nebo $u_i = 0$
$z = x - a_i$ nebo $v_i = 0$

g) - i) nemám