Konvexní množiny a polyedry

x_1, x_2 ... počty výrobků 1 a 2

$c = (40, 30)$

40, 30 kč zisky

2kg, 3kg $\leq$ 12kg

4h, 2h $\leq$ 16h

$\max 40x_1 + 30x_2$

z.p. $2x_1 + 3x_2 \leq 12$ (b)

$4x_1 + 2x_2 \leq 16$

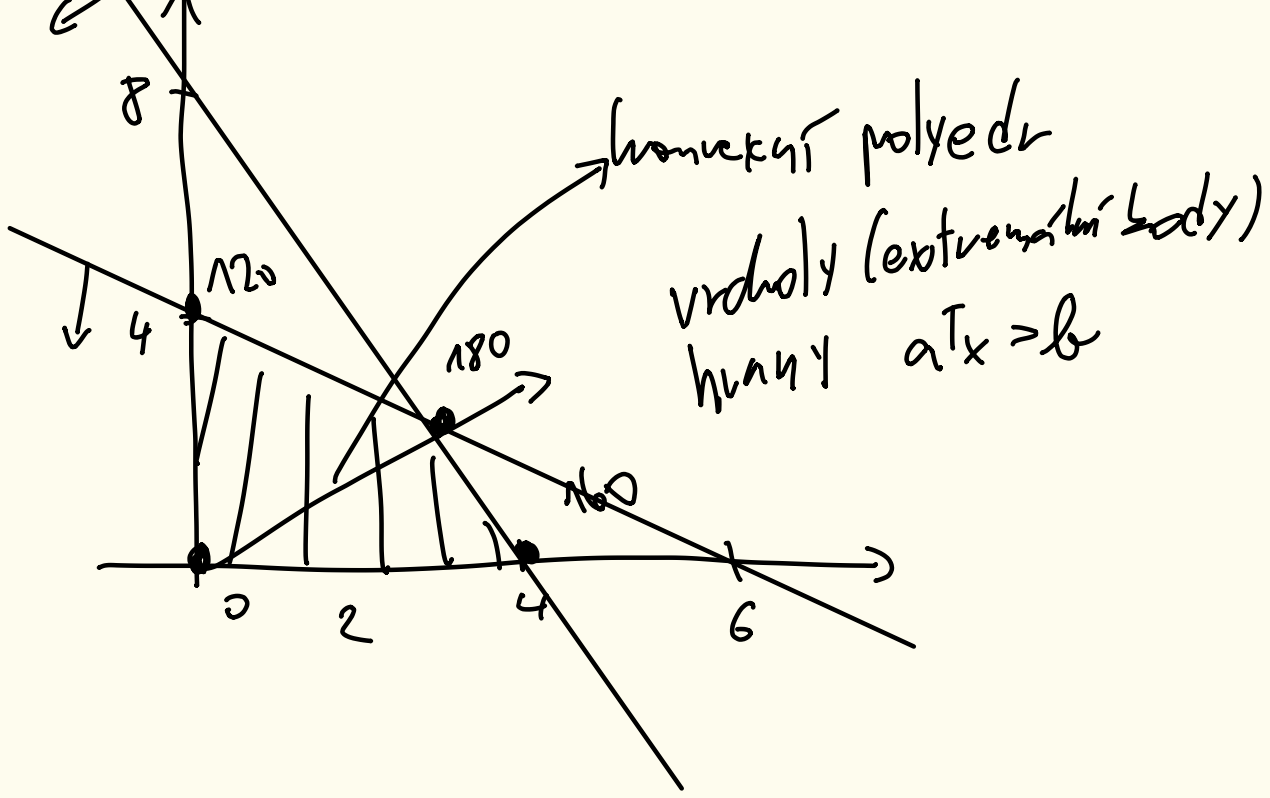
$A \nearrow$

$x_1, x_2 \geq 0$

$\min c^T x$

za podm. $Ax \geq b$

$x \in \mathbb{R}^n$



konvexní množiny

$(1-\alpha)x + \alpha y = x + \alpha(y-x)$

$0 \leq \alpha \leq 1$

směr

$\alpha = 1$

$\alpha = 1/2$

$\alpha = 0$

x • • y

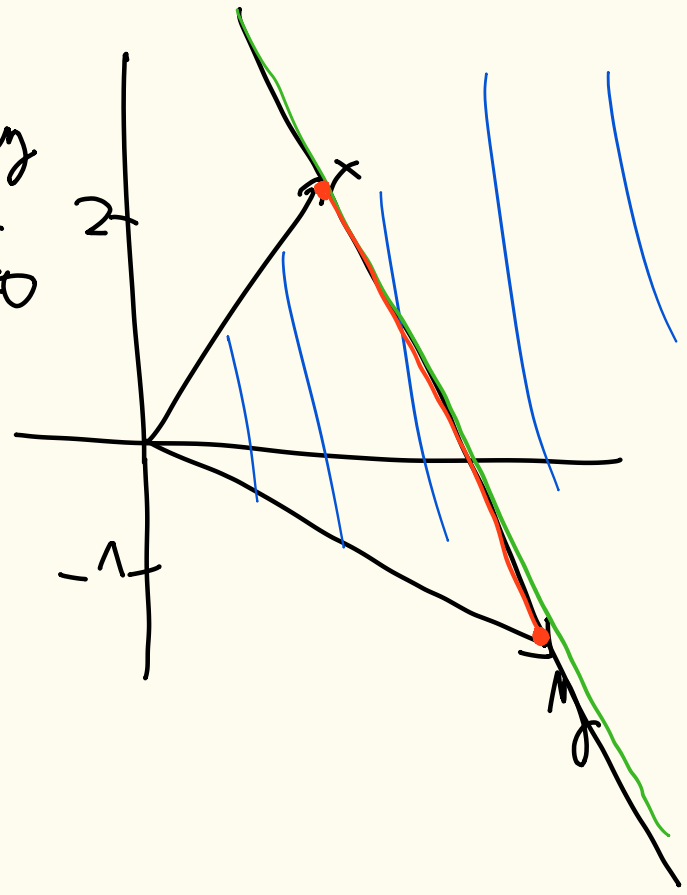
• z

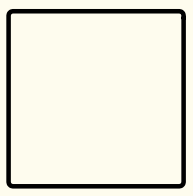
$\alpha_1 x + \alpha_2 y + \alpha_3 z$

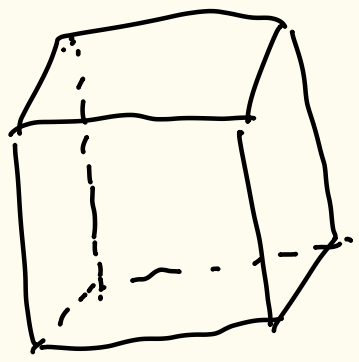
$\alpha_1 = 1/4 \rightarrow$ těžiště

lineární kombinace $\mathbb{R}^2$

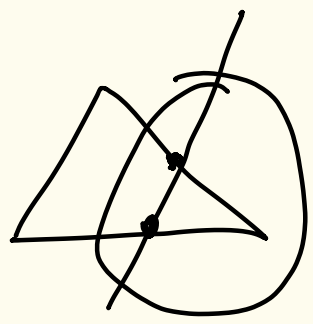
- afinní kombinace $(1-\alpha)x+\alpha y$ $\alpha\in\mathbb{R}$
- nezáporná kombinace $\alpha x+\beta y$, $\alpha,\beta\geq 0$
- konvexní $\dashv\vdash$







$x\in\mathbb{R}^n$, $\|x\|\leq 1$

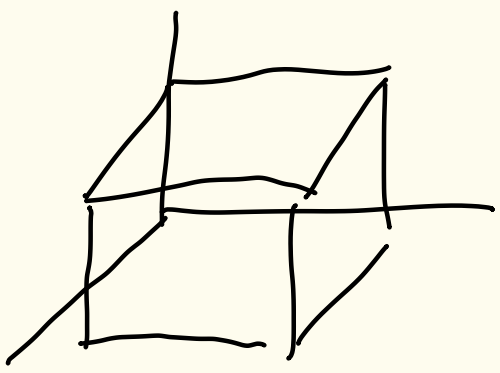


$\mathbb{R}^n$

$a\geq b$

$\Leftrightarrow$

$a_1\geq b_1,\dots,a_n\geq b_n$

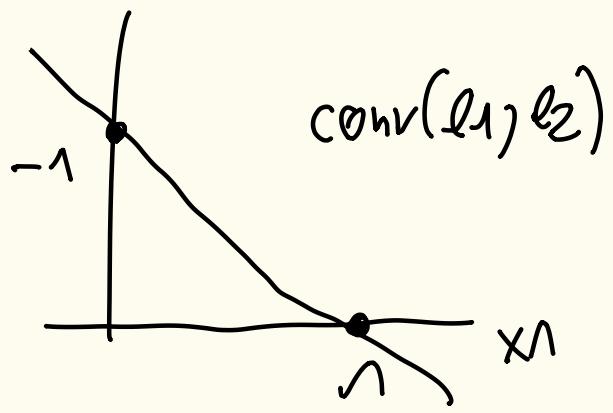


$-1\leq x_1\leq 1$

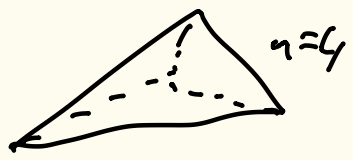
$-1\leq x_2\leq 1$

$-1\leq x_3\leq 1$

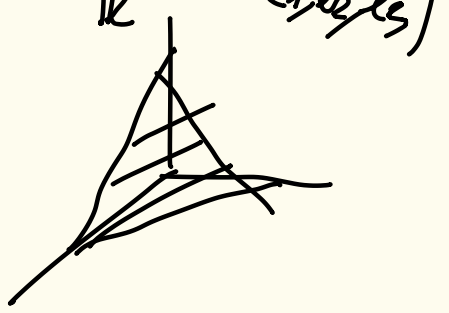
x_2 $\mathbb{R}^2$



$\text{conv}(\ell_1,\ell_2)$



$\mathbb{R}^3$ $\text{conv}(a_1,\dots,a_5)$

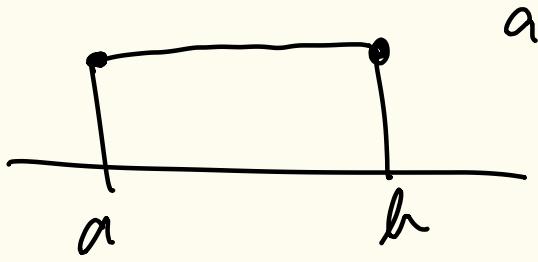


extremální bod

$\forall x_1,x_2\in X$, $x=\frac{1}{2}(x_1+x_2)$

$\Rightarrow x_1=x_2$

$X=[a,b]\subseteq\mathbb{R}$



a,b extrem.

$a = \frac{x+y}{2}$ $\quad y \leq x$

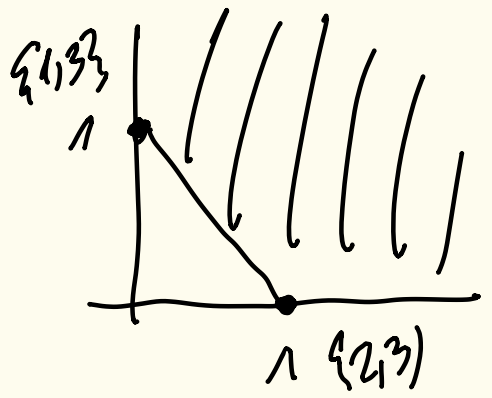
$x+y \leq 2x$

$y \leq x$

$\geq$

$x \geq 0, y \geq 0, x+y \geq 1$

$A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ -1 & -1 \end{bmatrix} \quad b = \begin{bmatrix} 0 \\ 0 \\ -1 \end{bmatrix} \quad Ax \geq b$



$|I| = 1$ ✗

$I = \{1,2\}$ $x=0$, $y=0$

$I = \{1,3\}$ $x=0$, $x+y=1$

$I = \{1,2,3\}$ ✗

hyperwürfel

$[-1,1]^n$

2^n extrem. Ecke

$\mathbb{R}^n$ stand. simplex