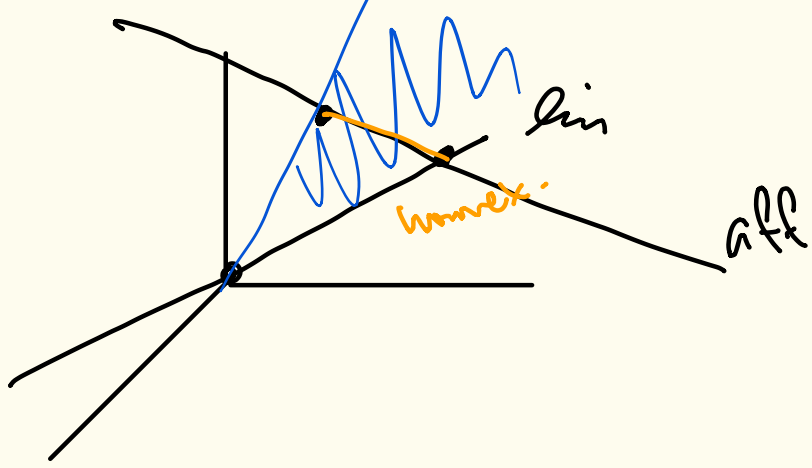
$n = 1, 2, 3$

$k = 1, 2, 3$

lin., afinní, nezáp., konexní



$n = 3$

$x_1 \dots x_n$

$\alpha_1 x_1 + \alpha_2 x_2 + \dots + \alpha_n x_n$

$\alpha_1 \dots \alpha_n \in \mathbb{R}$

aff $\alpha_1 + \dots + \alpha_n = 0$

nezáp. $\alpha_i \geq 0$

SVD

$$\max_{x} \sum_{ij} c_{ij} x_i x_j \qquad \|x\| = 1$$

$x^T C x$

$C \leftarrow (C + C^T)\,1/2$ symetrizace

C: $\lambda_1 v_1$, $\lambda_2 v_2$, $\vdots$, $\lambda_n v_n$

$\lambda_1 \geq \lambda_2 \geq \dots \geq \lambda_n$

$x \perp v_1$

$x \perp v_k$

$n = 100$

$k = 25$

$\Downarrow$

$x \in$ ortogonálního doplňku $\operatorname{span}\{v_1 \dots v_{25}\}$

λ_{26}

$A = UDV^T$

$A = UDV^T = \lambda_1 u_1 v_1^T + \dots + \lambda_n u_n v_n^T$

aproximace A maticí rank k

$A \in \mathbb{R}^{100 \times 100}$ rank 97

A' ... rank $A' = k$

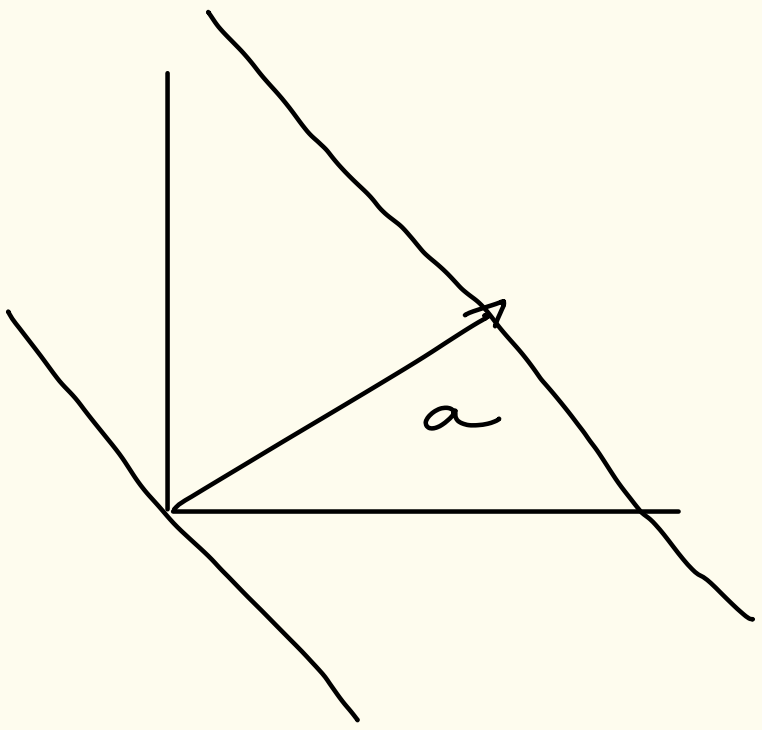
$\|A - A'\| \to \min$

A' 50

13.7 a) $X = \{ \alpha v, \ \alpha \in \mathbb{R} \}$

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

Kuželová množina:
průnik konečného počtu uzavřených poloprostorů



$a^T x \geq b$ ← číslo

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

$a^T x = b$

$[2,1]\, x = 1$

2 K.M.

$\{ Ax \geq b, \ x \in \mathbb{R}^n \}$

$Ax = b$

$v_1 \dots v_{n+1} \dots$ báze

ortog doplněk v

$\operatorname{span}\{v\}^{\perp}$

$n-1$ rovnic

$A = V^T$

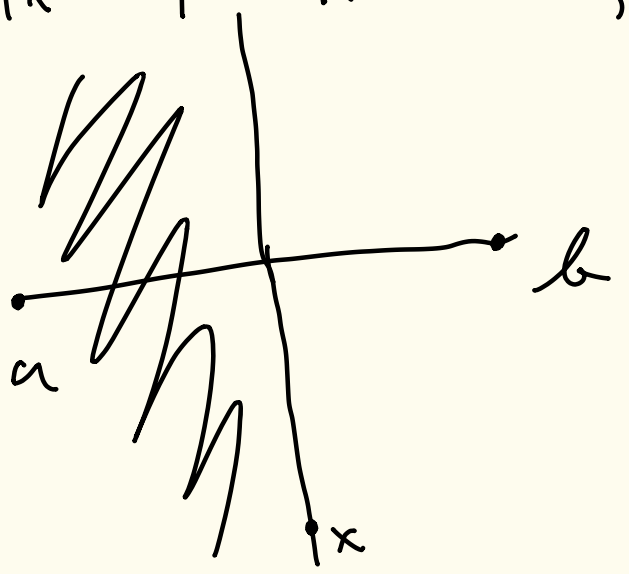
$V = [v_n \dots v_{n-1}]$

$\Leftrightarrow Ax \geq b \quad Ax \leq b$

$-Ax \geq -b$

$V^T x \geq 0 \quad -V^T x \geq 0$

$\{x \in \mathbb{R}^n : \|x-a\| \leq \|x-b\|\}$



? K. M.

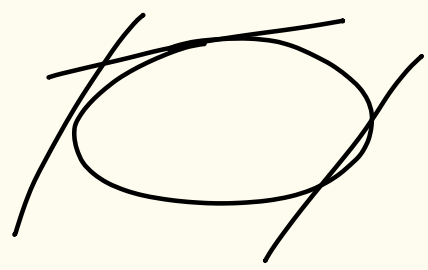
$Ax \geq b \rightarrow$ ořšlo

$x_0 = \frac{a+b}{2}$

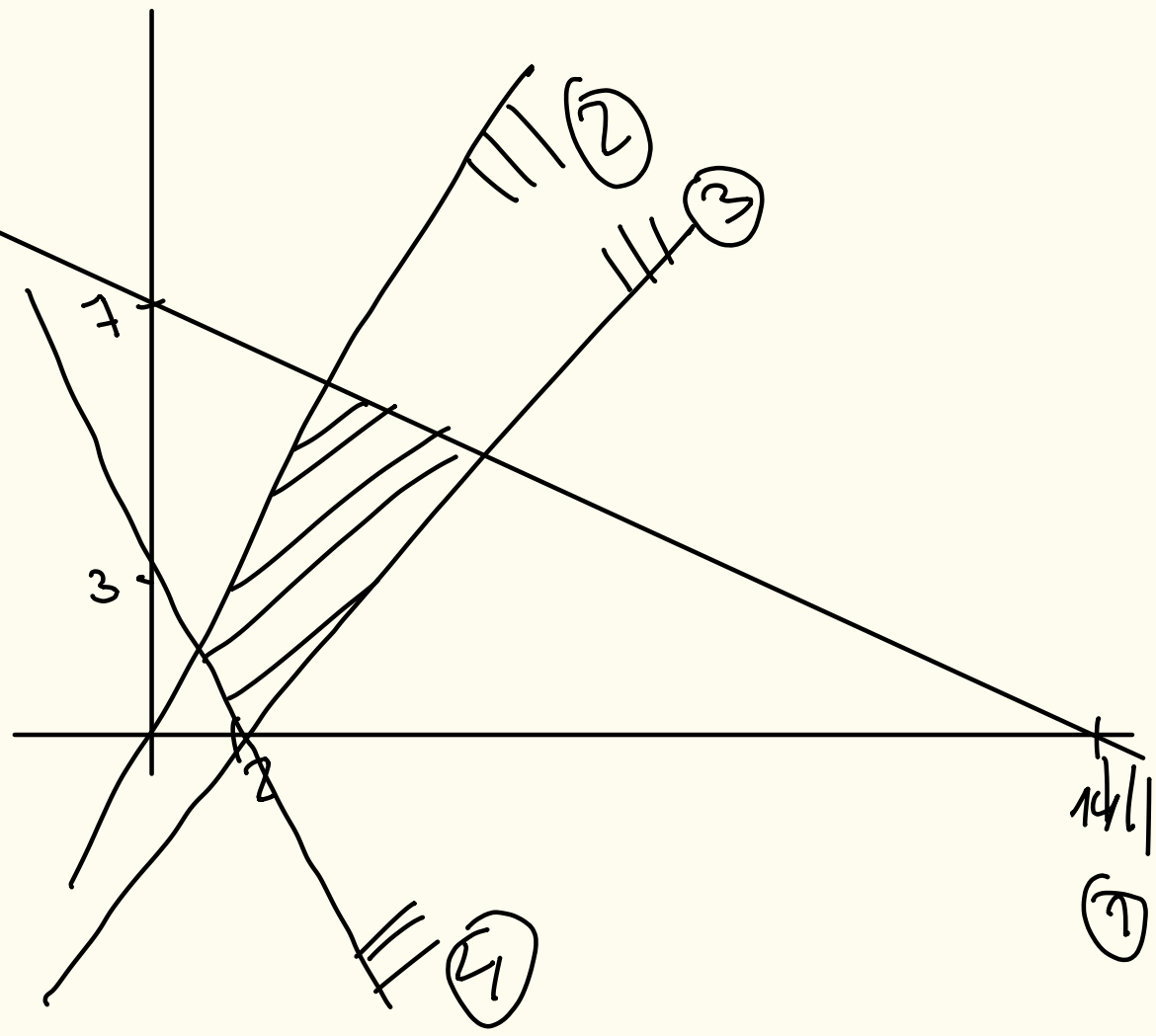
$(a-b) \cdot x = const$

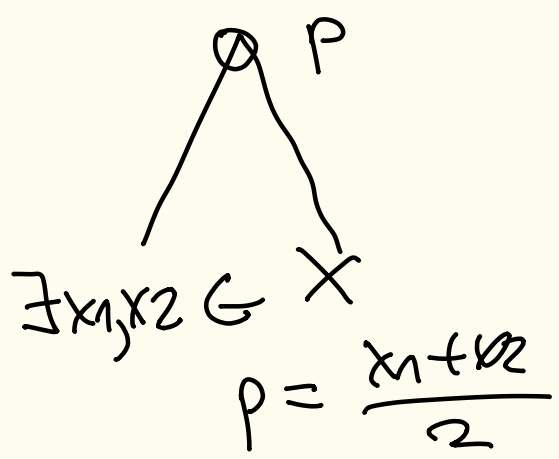
A

$x^T C x \leq 1$ C. pos def



$\begin{bmatrix} -1 & -2 \\ 3 & -1 \\ -1 & 1 \\ 2 & 1 \end{bmatrix} x \geq \begin{bmatrix} -14 \\ 0 \\ -2 \\ 4 \end{bmatrix}$

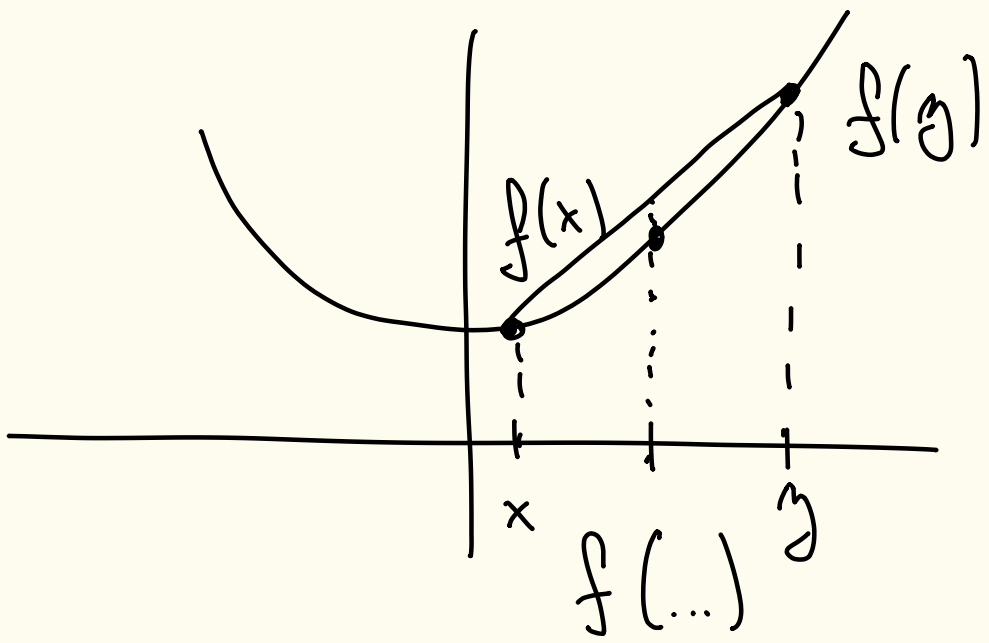




Iindex $I = \{i_1 \dots i_p\}$

$A_I x = b_I$

konv. f. na konv. mn.



$$f[(1-\alpha)x+\alpha y] \leq (1-\alpha)f(x) + \alpha f(y)$$

$$\alpha \in \langle 0,1 \rangle$$

$a^T x + b$ konvex?

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

$b \in \mathbb{R}$