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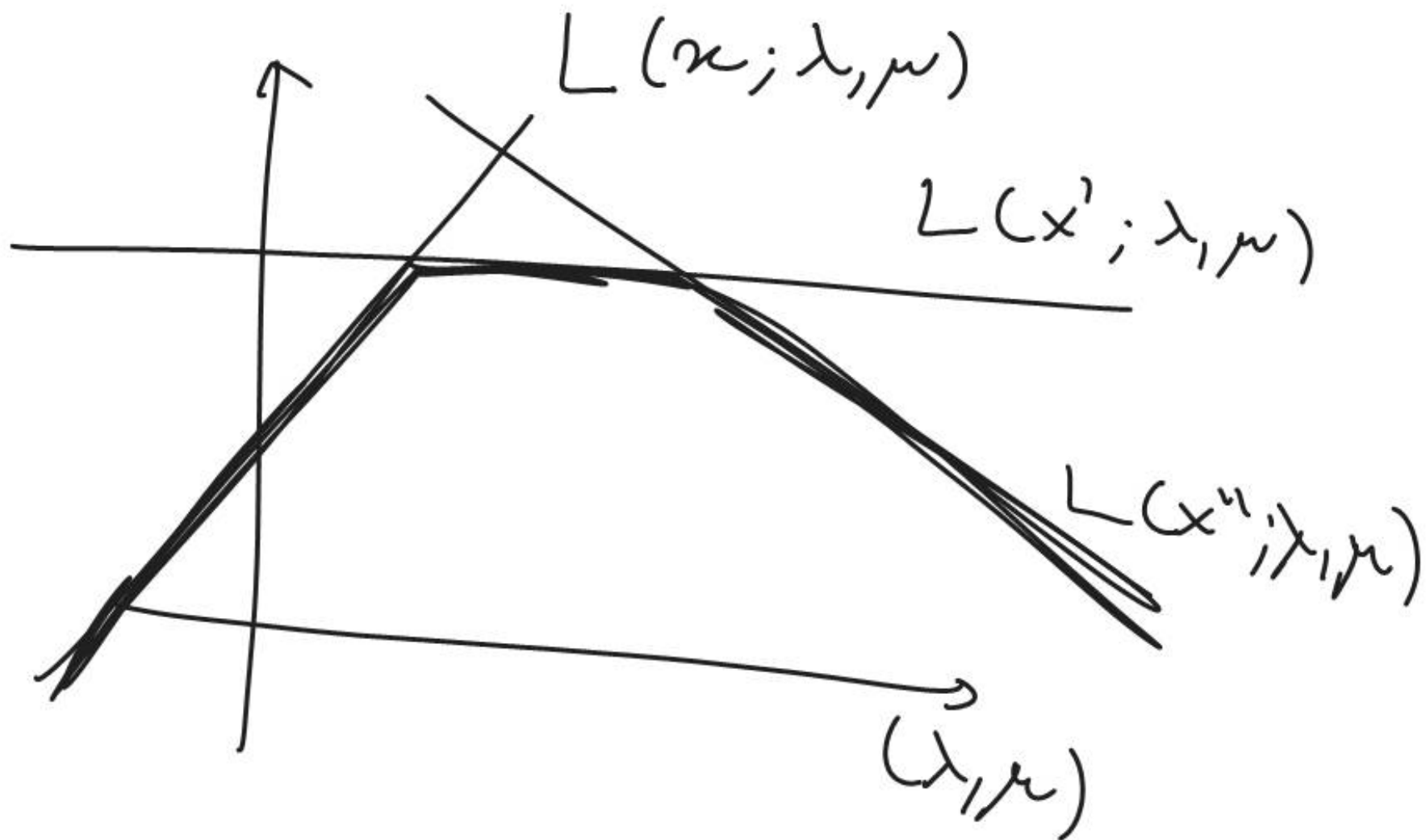
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Exam

Thursday, May, 9

9:15 9 am

Lisbon 2 pm



$\mathcal{P}$

$$\left[\begin{array}{l} \text{min. } (c_1 x_1 + \dots + c_n x_n) \\ \text{s.t. } x_i \geq 0, \sum_i x_i = 1 \end{array} \right]$$

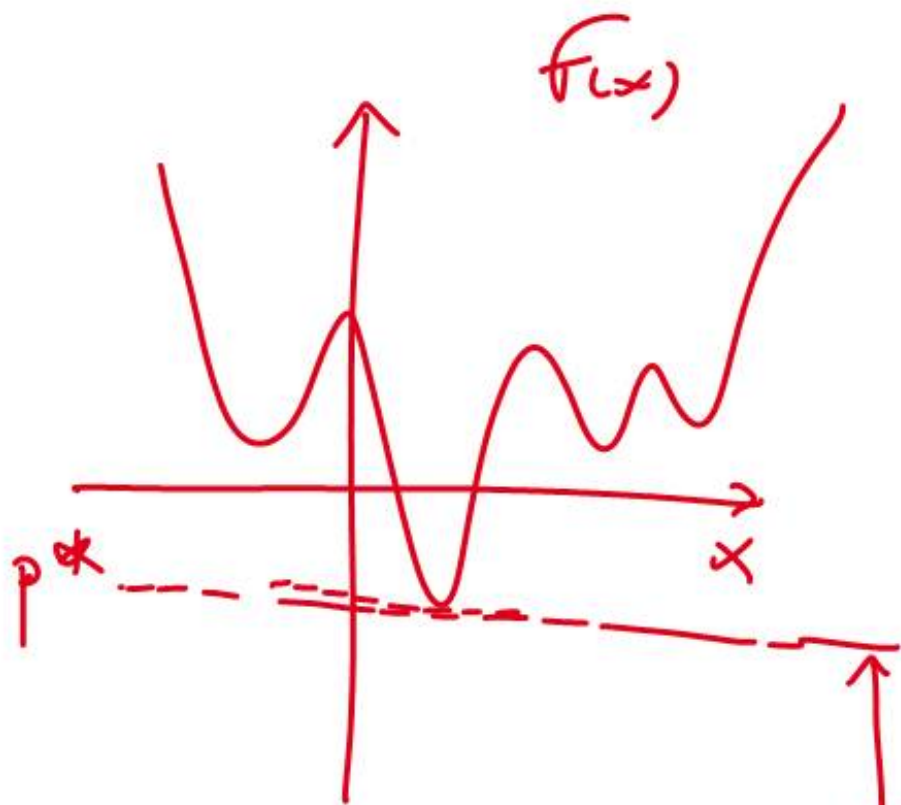
$n=4$

$$\min\{c_1, c_2, \dots, c_n\}$$

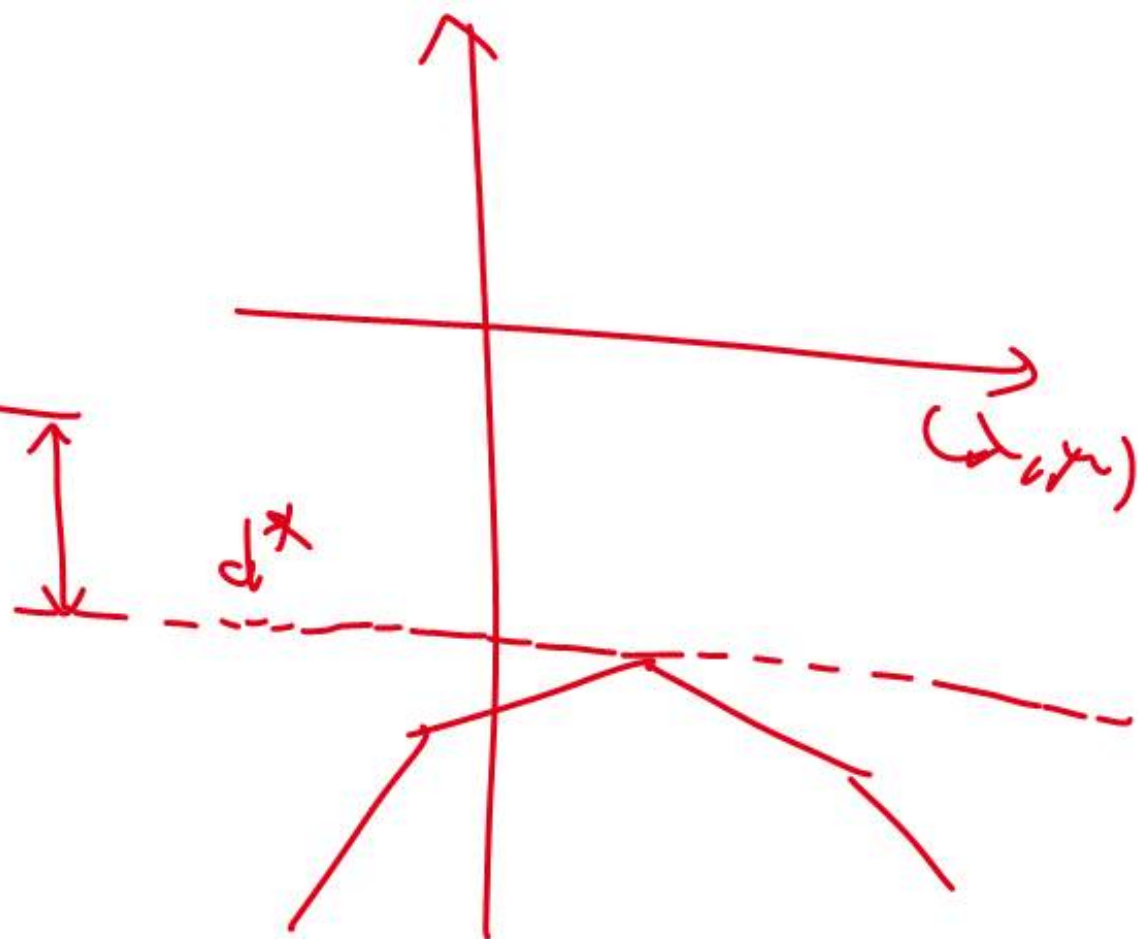


$$x = (1/4, 1/4, 1/4, 1/4)$$

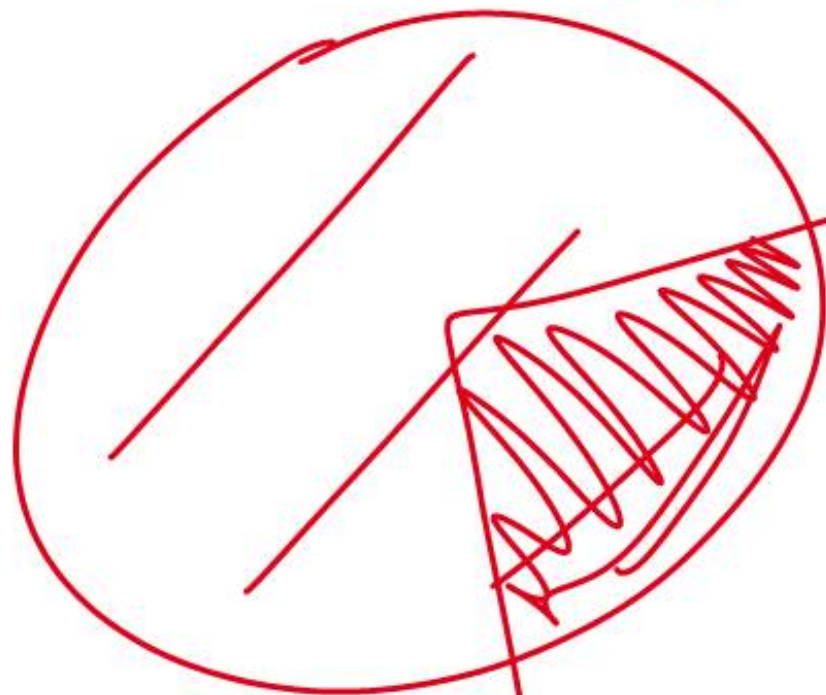
$$x = (0, 0, 1, 0) //$$



$$p^* \geq d^*$$

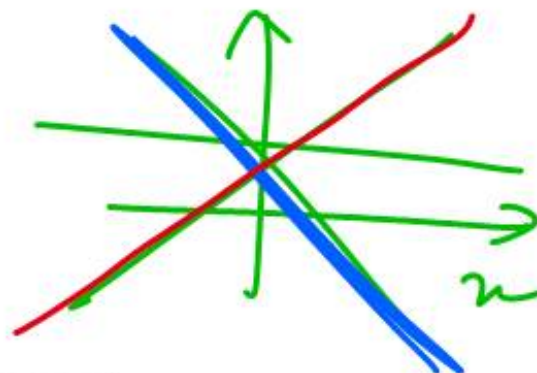


X



$Ax \leq b$

$$\begin{aligned} \underline{P}: \min \quad & c^T x \\ \text{s.t.} \quad & 1 - 1^T x \leq 0 \quad \lambda \in \mathbb{R} \\ & -x \leq 0 \quad \mu \in \mathbb{R}^n \end{aligned}$$



$$\begin{aligned} 1) \quad L(x; \lambda, \mu) &= \boxed{c^T x} + \lambda \boxed{(1 - 1^T x)} - \mu^T \boxed{x} \\ &= x^T (c - \lambda 1 - \mu) + \lambda \end{aligned}$$

$$2) \quad L(\lambda, \mu) = \inf_{x \in \mathbb{R}^n} L(x; \lambda, \mu)$$

$$\mathbb{R} \times \mathbb{R}^n \begin{cases} c - \lambda 1 - \mu = 0 \\ \lambda \end{cases} \text{ if } c - \lambda 1 - \mu = 0$$

$$\begin{cases} -\infty & \text{otherwise} \end{cases}$$



3)

$$\begin{array}{ll} \max. & L(x, \mu) \\ \text{s.t.} & \mu \geq \rho \end{array}$$

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$$\begin{array}{ll} \max. & \lambda \\ \text{s.t.} & \mu \geq 0 \\ & \rightarrow c = \lambda \mathbb{1} + \mu \end{array}$$

$$(c - \lambda \mathbb{1} / \mu = 0)$$

$$\lambda \mathbb{1} = c - \mu$$

$$\begin{array}{ll} \max. & \lambda \\ \text{s.t.} & \lambda \mathbb{1} \leq c \end{array}$$

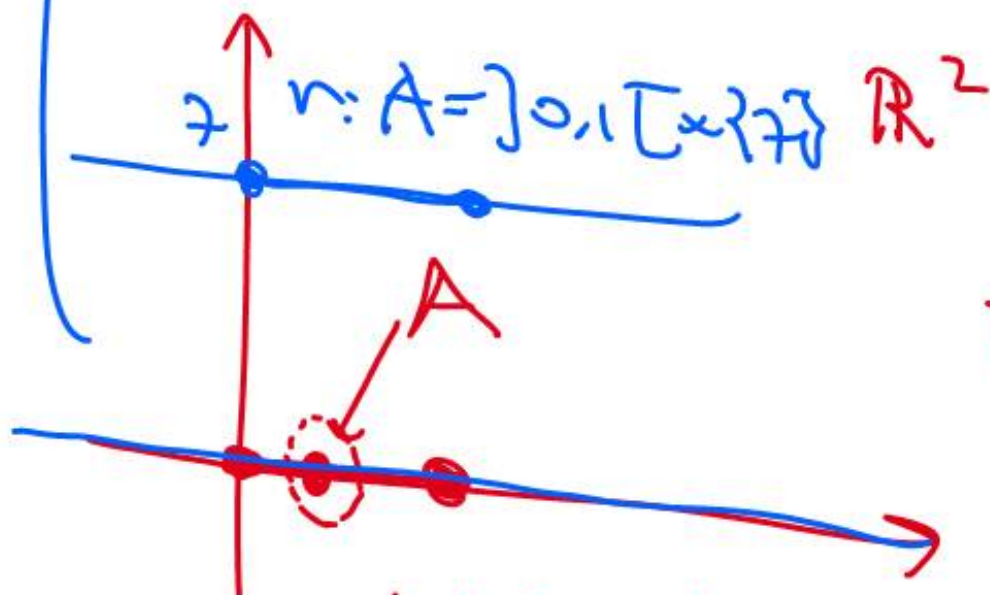
$$\begin{array}{l} \lambda \leq c_1 \\ \lambda \leq c_2 \\ \vdots \\ \lambda \leq c_n \end{array}$$



$$\text{int}(A) =]0,1[$$

$\text{int } A \neq \emptyset$
 $\Downarrow$
 $r: A = \text{int } A$

$$r: A =]0,1[\times \{0\}$$



$$\text{int}(A) = \emptyset$$

