## Linear Optimization

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## Chapter 1

## First Chapter

**THEOREM 1.1.** Let  $A \in \mathbb{R}^{m \times n}$ . Let  $b \in \mathbb{R}^m$ . Define  $S \subseteq \mathbb{R}^n$  by  $S := \{x \in \mathbb{R}^n : Ax \leq b\}$ . Let  $\bar{x} \in S$ . Let  $A^= \in \mathbb{R}^{p \times n}$  and  $b^= \in \mathbb{R}^p$  be such that  $A^=x = b^=$ . Then  $\bar{x}$  is an extreme point of S if and only if  $\operatorname{rank}(A^=) = n$ .