
2. CONVEX SETS

AFFINE SETS

Definition of affine set

Example of affine set

Definition of affine hull

Example of affine hull

CONVEX SETS

Definition of convex set

Definition of convex hull

Example of convex set

Example of convex hull

CONVEX SETS

How to determine that a set is convex?

CONES

Definition of cone

Definition of conic hull

Example of cone

Example of conic hull

HYPERPLANE, HALFSPACES & POLYHEDRA

Definition of hyperplane

Definition of halfspace

Definition of polyhedra

Example of halfspace

Example of polyhedra

SETS SUMMARY

	Affine	Convex	Cone
Affine set	☐	☐	☐
Convex set	☐	☐	☐
Cone	☐	☐	☐
Empty set $\emptyset$	☐	☐	☐
Single point	☐	☐	☐
$\mathbb{R}^n$	☐	☐	☐
$\mathbb{R}_+^n$	☐	☐	☐
Line segment	☐	☐	☐
Line segment through 0	☐	☐	☐
Line	☐	☐	☐
Line through 0	☐	☐	☐
Ray $\{x_0 + \theta v \theta \geq 0\}$	☐	☐	☐
Ray $\{\theta v \theta \geq 0\}$	☐	☐	☐
Hyperplane	☐	☐	☐
Halfspace	☐	☐	☐
Polyhedra	☐	☐	☐
Subspace	☐	☐	☐
$\{(x_1, x_2), x_2 = x_1 \}$	☐	☐	☐
1 st and 3 rd quadrants in $\mathbb{R}^2$	☐	☐	☐

OPERATIONS THAT PRESERVE CONVEXITY

SEPARATING AND SUPPORTING HYPERPLANES

Separating hyperplane theorem

Supporting hyperplane

PROPER CONE & GENER. INEQUALITIES

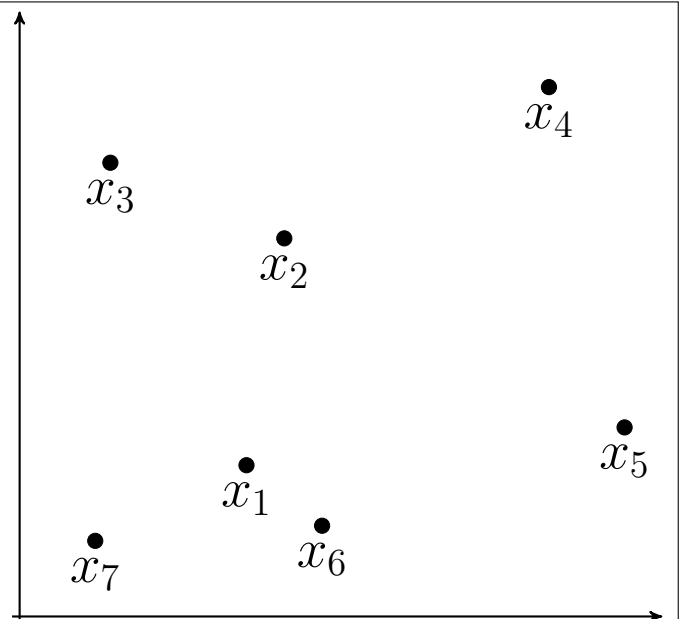
Definition of proper cone

	Proper
$\mathbb{R}^n$	☐
$\mathbb{R}_+^n$	☐
Line through origin	☐
Ray $\{\theta v \theta \geq 0\}$	☐
Subspace	☐
$\{(x_1, x_2), x_2 = x_1 \}$	☐
1 st and 3 rd quad. $\mathbb{R}^2$	☐

Definition of generalized inequality

$$K = \mathbb{R}_+^2$$

	$\preceq_K$	$\succeq_K$	
x_1	☐	☐	x_2
x_1	☐	☐	x_3
x_1	☐	☐	x_4
x_1	☐	☐	x_5
x_1	☐	☐	x_6
x_1	☐	☐	x_7

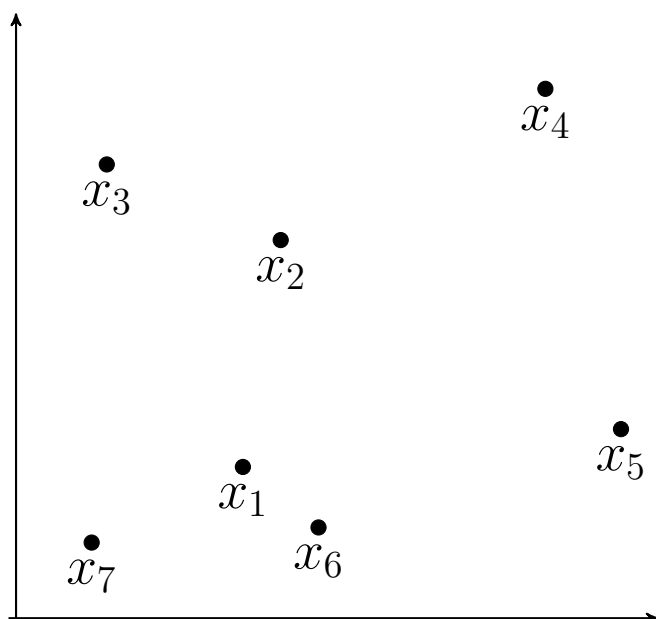


MINIMUM AND MINIMAL ELEMENTS

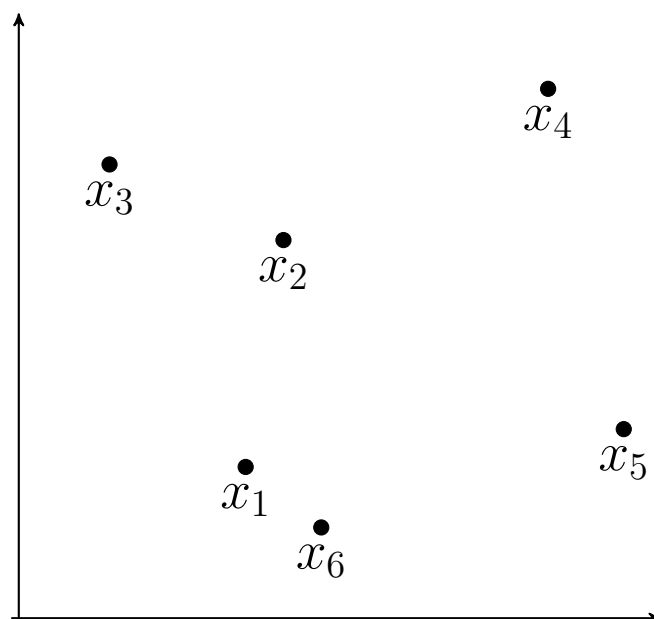
Minimum element of a set

Minimal element of a set

Example of minimum element



Example of minimal element

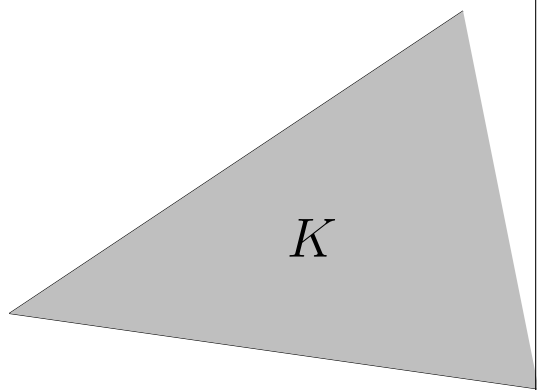


DUAL CONE AND GENER. INEQUALITIES

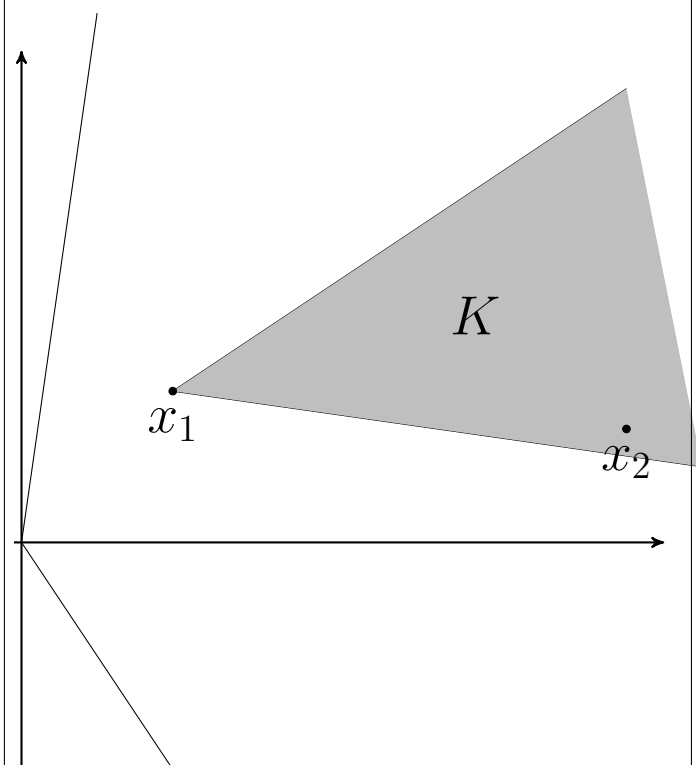
Dual cone

Dual generalized inequalities

Example of dual cone



Example of dual GI

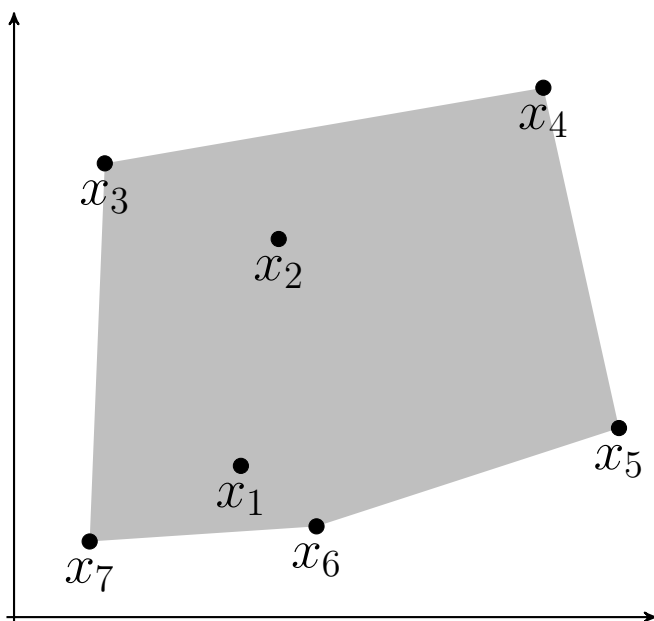


MINIMUM AND MINIMAL ELEMENTS VIA DUAL

Minimum element of a set

Minimal element of a set

Example of minimum



Example of minimal

