Convex Hull

1 Why

2 Definition

The *convex hull* of a subset of n-dimensional space is the intersection of all convex sets containing the set.

2.1 Notation

We denote the convex hull of $S \subset \mathbf{R}^n$ by $\mathbf{conv}\, S$.

3 Characterization

Proposition 1. *Let $S \subset \mathbf{R}^n$. $\mathbf{conv}\, S$ is the set of all convex combinations of elements of S.*

Proposition 2. *The convex hull of $\{b_1, \ldots, b_m\} \subset \mathbf{R}^n$ consists of all vectors*

$$\lambda_1 b_1 + \lambda_2 b_2 + \cdots + \lambda_m b_m.$$

where $\lambda_i \geq 0$ and $\sum_i \lambda_i = 1$.