Why

TODO

Definition

For a nonzero $b \in \mathbf{R}^n$ and $\beta \in \mathbf{R}$ the sets

$$\{x \in \mathbf{R}^n \mid \langle x \rangle b \leq \beta\}, \quad \{x \in \mathbf{R}^n \mid \langle x \rangle b \geq \beta\},$$

are *closed halfspaces* and the sets

$$\{x \in \mathbf{R}^n \mid \langle x \rangle b \leq \beta\}, \quad \{x \in \mathbf{R}^n \mid \langle x \rangle b \geq \beta\},$$

are *open halfspaces.*

Each of these is nonempty and convex. As with hyperplanes, the same four sets appear if one uses $\lambda\beta$ and λb above, so the halfspaces depend only on the hyperplane $H = \{x \mid \langle x \rangle b = \beta\}$.

Halfspaces

Hyperplanes

Affine Set Dimensions

Subspace Orthogonal Complements

Subspace Dimensions

Orthogonal Complements

Vector Space Dimensions

Vector Space Bases

Inner Products

Affine Sets and Subspaces

Span

Linearly Dependent Vectors

Translate Sets

Subspaces

Linear Combinations

Affine Sets

Vectors

N-Dimensional Space

Distance

Space Distance

Plane Distance

Interval Length

Intervals

Real Line

Real Plane

Real Space

Integral Line

Real Order

Sequences

Geometry

Real Numbers

Fields

Direct Products

Set Numbers

Rational Numbers

Groups

Finite Sets

Integer Arithmetic

Integer Additive Inverse

Natural Additive Identity

Natural Multiplicative Identity

Integer Sums

Inverse Elements

Equivalent Sets

Arithmetic

Identity Elements

Element Functions

Integer Products

Natural Powers

Algebras

Operations

Function Inverses

Function Images

Family Unions and Intersections

Integer Numbers

Natural Products

Function Composites

Families

Equivalence Relations

Natural Sums

Functions

Natural Order

Recursion Theorem

Relations

Peano Axioms

Cartesian Products

Natural Induction

Set Powers

Generalized Set Dualities

Natural Numbers

Successor Sets

Intersection of Empty Set

Unordered Triples

Set Dualities

Set Unions and Intersections

Partitions

Set Intersections

Pair Unions

Ordered Pairs

Set Complements

Set Differences

Set Unions

Pair Intersections

Unordered Pairs

Empty Set

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets

Identities

Names

Letters

Objects