**Why**

We generalize the notion of angles in the plane to angles in space.

**Definition**

The *angle* (*unsigned angle*) between $x \in \mathbf{R}^3$ and $y \in \mathbf{R}^3$ is the real number

$$\theta = \angle(x, y) = \cos^{-1} \frac{x^\top y}{\|x\| \|y\|}$$

Space Vector Angles

Plane Vector Angles

Plane Norm

Plane Distance   Plane Vectors

Interval Length

Intervals

Real Plane   Real Line

Real Order   Integral Line

Geometry   Rational Order   Real Numbers

Rational Numbers

Integer Arithmetic

Lists

Set Numbers   Natural Additive Identity   Natural Multiplicative Identity   Integer Products

Finite Sets   Identity Elements   Arithmetic   Natural Powers

Direct Products   Equivalent Sets   Integer Order   Integer Sums   Natural Products

Family Unions and Intersections   Function Inverses   Comparisons

Families   Function Composites   Function Images   Operations   Orders   Integer Numbers   Natural Sums

Functions   Converse Relations   Equivalence Relations   Natural Order   Recursion Theorem

Relations   Peano Axioms

Set Products   Natural Induction

Generalized Set Dualities   Set Powers   Natural Numbers

Set Unions and Intersections   Set Dualities   Unordered Triples   Successor Sets   Intersection of Empty Set   Partitions   Set Symmetric Differences

Ordered Pairs   Pair Unions   Set Intersections   Set Complements

Pair Intersections   Set Unions   Set Differences

Unordered Pairs   Empty Set

Set Specification

Set Equality

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Sets   Identities

Names

Letters   Objects