Why

[1]

Definition

The *matrix-vector product* between an $m \times n$-matrix and an n-vector is the result of the linear combination of the columns of the matrix with the sequence of scalars in the vector. So the matrix-vector product is an m-vector.

Notation

Let C be a nonempty set. Let $A \in C^{m \times n}$ and let $x \in C^n$. As usual, we denote the matrix-vector product of A with x by Ax, read "A x," and defined by

$$b_i = \sum_{j=1}^{n} a_{ij} x_j$$

for $i \in \{1, 2, \ldots, m\}$. Let

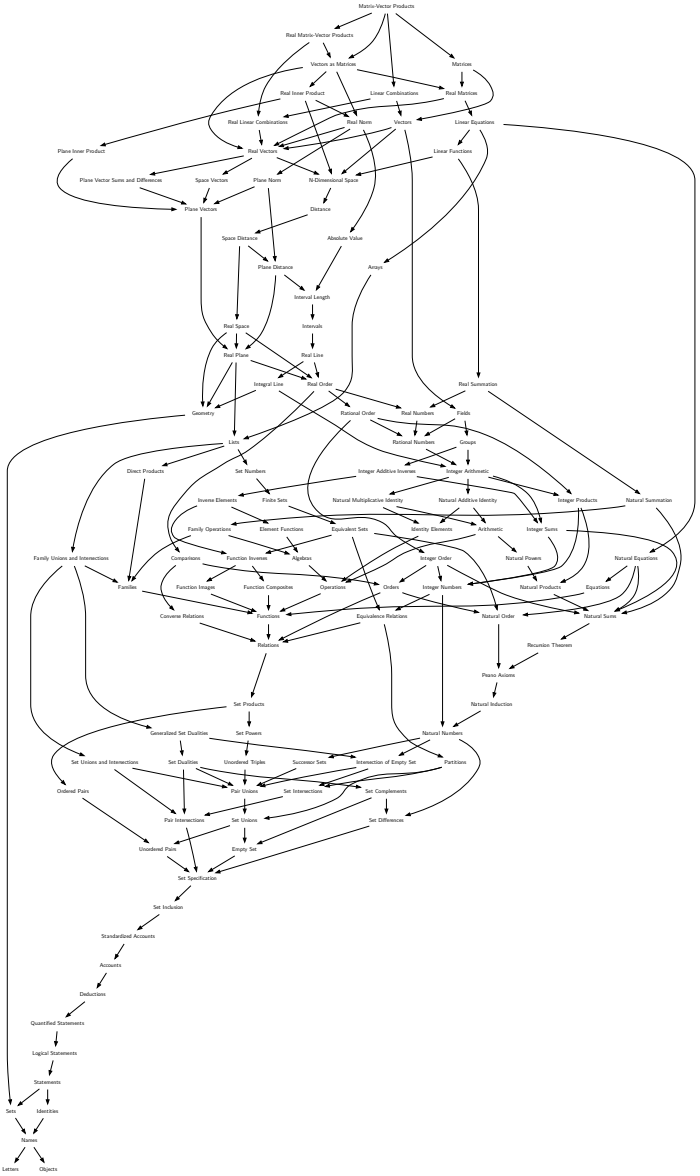
$$A = \begin{bmatrix} a_1^\top \\ a_2^\top \\ \vdots \\ a_m^\top \end{bmatrix}$$

Or, if $a_i^\top$ is the ith row of A, then

$$b_i = a_i^\top x$$

for $i \in \{1, 2, \ldots, m\}$.

[1] Future editions will include.


Matrix-Vector Products
Real Matrix-Vector Products
Vectors as Matrices
Matrices
Real Inner Product
Linear Combinations
Real Matrices
Real Linear Combinations
Real Norm
Vectors
Linear Equations
Plane Inner Product
Real Vectors
Linear Functions
Plane Vector Sums and Differences
Space Vectors
Plane Norm
N-Dimensional Space
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Distance
Space Distance
Absolute Value
Plane Distance
Arrays
Interval Length
Real Space
Intervals
Real Plane
Real Line
Integral Line
Real Order
Real Summation
Geometry
Rational Order
Real Numbers
Fields
Rational Numbers
Groups
Lists
Direct Products
Set Numbers
Integer Additive Inverses
Integer Arithmetic
Inverse Elements
Finite Sets
Natural Multiplicative Identity
Natural Additive Identity
Integer Products
Natural Summation
Family Operations
Element Functions
Equivalent Sets
Identity Elements
Arithmetic
Integer Sums
Family Unions and Intersections
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Families
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Function Composites
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Natural Products
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Converse Relations
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Relations
Recursion Theorem
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
Ordered Pairs
Pair Unions
Set Intersections
Set Complements
Pair Intersections
Set Unions
Set Differences
Unordered Pairs
Empty Set
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects