Definition

Let $A \in \mathbf{R}^{l \times m}$ and $B \in \mathbf{R}^{m \times n}$. In this case we call A and B *conformable*. The *matrix-matrix product* of A and B is the matrix $C \in \mathbf{R}^{l \times n}$ whose ith row c_i (for $i = 1, \ldots, n$) is defind $c_i = Ab_i$ where b_i is the ith row of B.

Notation

We denote the matrix product of A and B by AB.

Properties

Future editions will contain accounts of the following basic properties.

Proposition 1. *Matrix multiplication is associative.*

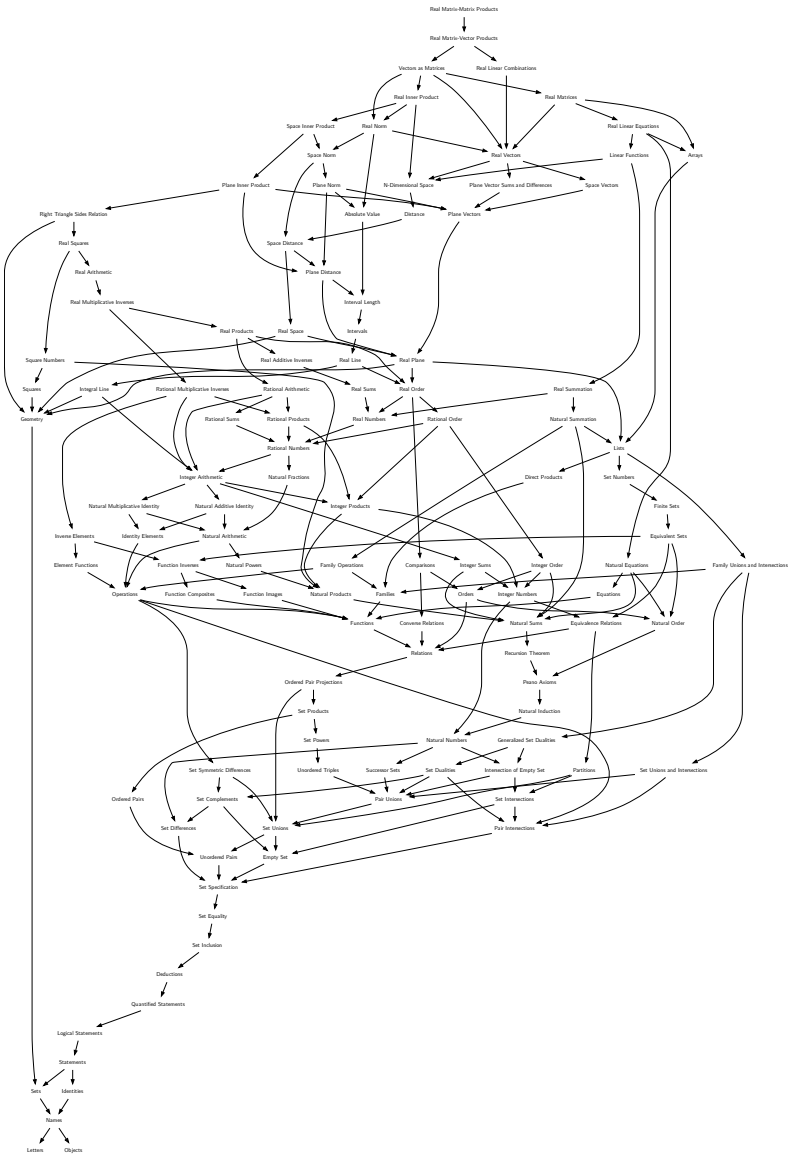
Proposition 2. *Matrix multiplication is not commutative.*

Indeed, the matrix-matrix product of B and A may not even be defined, if B and A are not conformable.

Identity matrix

The matrix which is the identity under the operation of multiplication is the one which has ones on its diagonals and zero elswhere.[1] We denote the $d \times d$ identity matrix by I_d, or, when no confusion is possible by I.

[1] Future editions will improve and expand.


Real Matrix-Matrix Products
Real Matrix-Vector Products
Vectors as Matrices
Real Linear Combinations
Real Inner Product
Real Matrices
Space Inner Product
Real Norm
Real Linear Equations
Space Norm
Real Vectors
Linear Functions
Arrays
Plane Inner Product
Plane Norm
N-Dimensional Space
Plane Vector Sums and Differences
Space Vectors
Right Triangle Sides Relation
Absolute Value
Distance
Plane Vectors
Real Squares
Space Distance
Real Arithmetic
Plane Distance
Real Multiplicative Inverses
Interval Length
Real Products
Intervals
Real Space
Square Numbers
Real Additive Inverses
Real Line
Real Plane
Squares
Integral Line
Rational Multiplicative Inverses
Rational Arithmetic
Real Sums
Real Order
Real Summation
Geometry
Rational Sums
Rational Products
Real Numbers
Rational Order
Natural Summation
Rational Numbers
Lists
Integer Arithmetic
Natural Fractions
Direct Products
Set Numbers
Natural Multiplicative Identity
Natural Additive Identity
Integer Products
Finite Sets
Inverse Elements
Identity Elements
Natural Arithmetic
Equivalent Sets
Element Functions
Function Inverses
Natural Powers
Family Operations
Comparisons
Integer Sums
Integer Order
Natural Equations
Family Unions and Intersections
Operations
Function Composites
Function Images
Natural Products
Families
Orders
Integer Numbers
Equations
Functions
Converse Relations
Natural Sums
Equivalence Relations
Natural Order
Relations
Recursion Theorem
Ordered Pair Projections
Peano Axioms
Set Products
Natural Induction
Set Powers
Natural Numbers
Generalized Set Dualities
Set Symmetric Differences
Unordered Triples
Successor Sets
Set Dualities
Intersection of Empty Set
Partitions
Set Unions and Intersections
Ordered Pairs
Set Complements
Pair Unions
Set Intersections
Set Differences
Set Unions
Pair Intersections
Unordered Pairs
Empty Set
Set Specification
Set Equality
Set Inclusion
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects