Why

We can view the set of real-valued $n \times k$ matrices as a vector space over $\mathbf{R}$.

Definition

The *matrix sum* of two matrices $A, B \in \mathbf{R}^{n \times k}$ is the matrix $C \in \mathbf{R}^{n \times k}$ defined by $C_{ij} = A_{ij} + B_{ij}$. In other words, the matrix C is given by summing the entires of A and B "entry-wise". We denote the matrix sum by $A + B$.

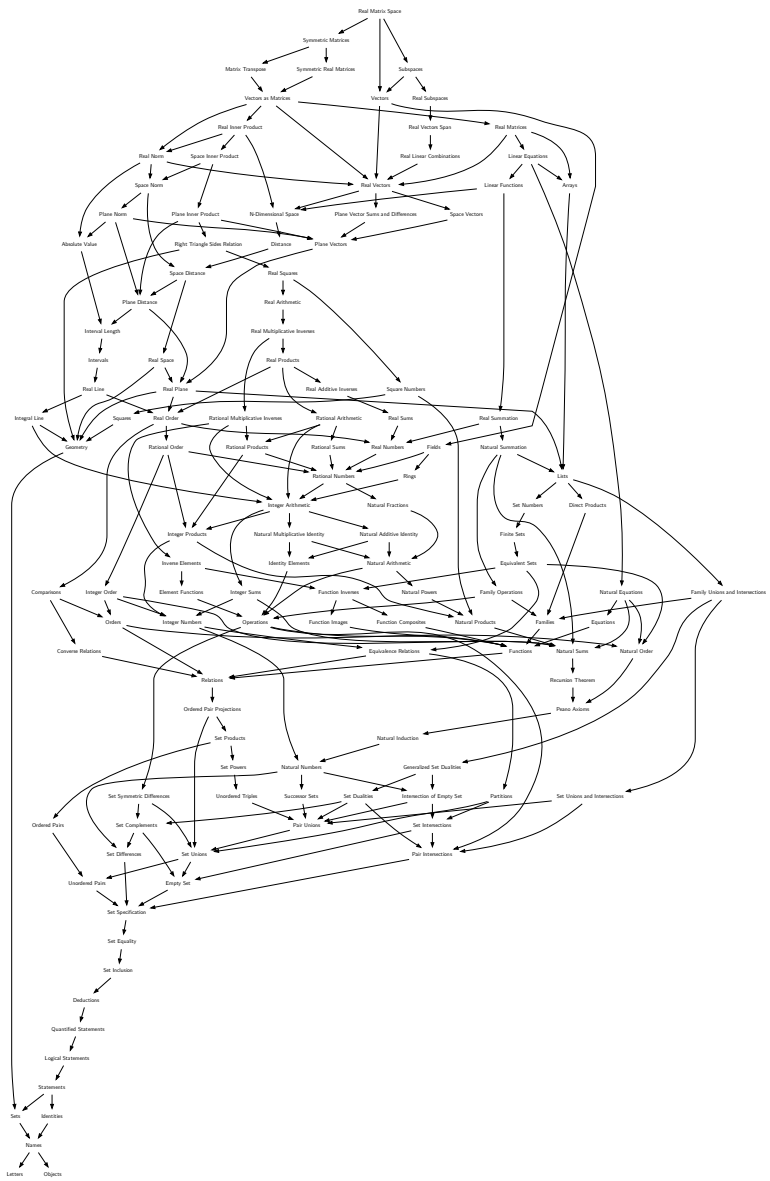
For $\alpha \in \mathbf{R}$, the *α-scaled version* of $A \in \mathbf{R}^{n \times k}$ is the matrix $C \in \mathbf{R}^{n \times k}$ given by $C_{ij} = \alpha A_{ij}$. In other words, the matrix C is given by scaling the entries of A "entry-wise". We denote the α-scaled version of A by αA. These two definitions are justified by the following.

The *$n \times k$-matrix space* is the vector space over $\mathbf{R}^{n \times k}$ in which addition is given by the matrix sumer and scalar multiplication by entry-wise scaling.[1]

Subspace of symmetric matrices

The subset of symmetric n by n matrices is a subset of $\mathbf{R}^{n \times n}$.

[1] Future editions will rework this sheet.


Real Matrix Space
Symmetric Matrices
Matrix Transpose
Symmetric Real Matrices
Subspaces
Vectors as Matrices
Vectors
Real Subspaces
Real Inner Product
Real Vectors Span
Real Matrices
Real Norm
Space Inner Product
Real Linear Combinations
Linear Equations
Space Norm
Real Vectors
Linear Functions
Arrays
Plane Norm
Plane Inner Product
N-Dimensional Space
Plane Vector Sums and Differences
Space Vectors
Absolute Value
Right Triangle Sides Relation
Distance
Plane Vectors
Space Distance
Real Squares
Plane Distance
Real Arithmetic
Interval Length
Real Multiplicative Inverses
Intervals
Real Space
Real Products
Real Line
Real Plane
Real Additive Inverses
Square Numbers
Integral Line
Square
Real Order
Rational Multiplicative Inverses
Rational Arithmetic
Real Sums
Real Summation
Geometry
Rational Order
Rational Products
Rational Sums
Real Numbers
Fields
Natural Summation
Rational Numbers
Rings
Lists
Integer Arithmetic
Natural Fractions
Set Numbers
Direct Products
Integer Products
Natural Multiplicative Identity
Natural Additive Identity
Finite Sets
Inverse Elements
Identity Elements
Natural Arithmetic
Equivalent Sets
Comparison
Integer Order
Element Functions
Integer Sums
Function Inverses
Natural Powers
Family Operations
Natural Equations
Family Unions and Intersections
Orders
Integer Numbers
Operations
Function Images
Function Composites
Natural Products
Families
Equations
Converse Relations
Equivalence Relations
Functions
Natural Sums
Natural Order
Relations
Recursion Theorem
Ordered Pair Projections
Peano Axioms
Set Products
Natural Induction
Set Powers
Natural Numbers
Generalized Set Duality
Set Symmetric Differences
Unordered Triples
Successor Sets
Set Duality
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