Why

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

Definition

The *matrix sum* of two matrices $A, B \in \mathsf{R}^{n \times k}$ is the matrix $C \in \mathsf{R}^{n \times k}$ 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 $A + B$.

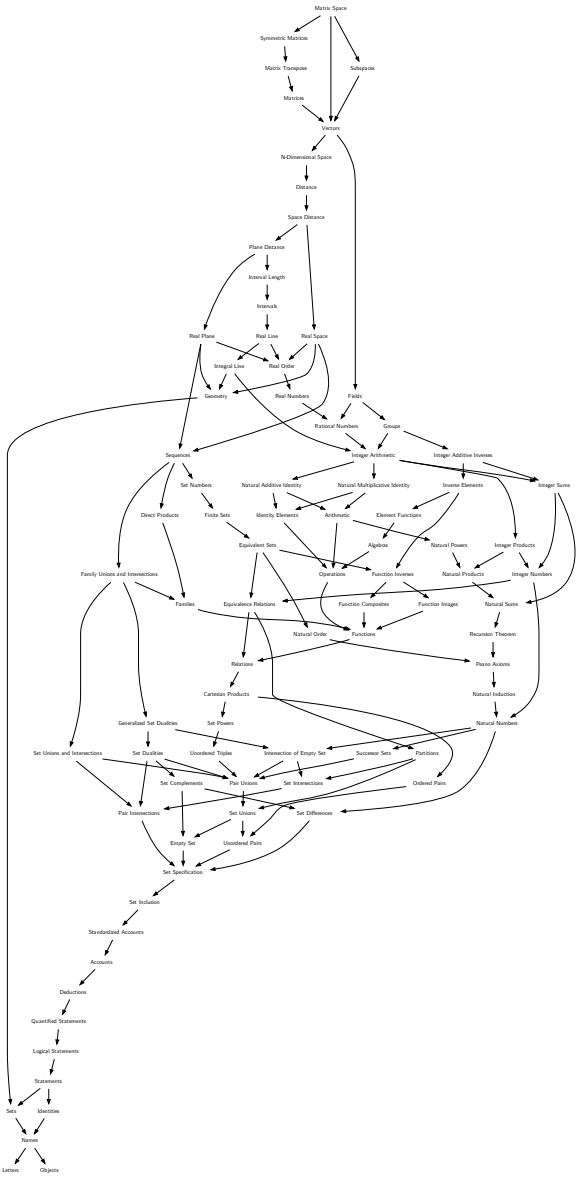
For $\alpha \in \mathsf{R}$, the *α-scaled version* of $A \in \mathsf{R}^{n \times k}$ is the matrix $C \in \mathsf{R}^{n \times k}$ given by $C_{ij} = \alpha A_{ij}$. In other words, the matrix C is given by scaling the entries of A "entry-wise". We denote the α-scaled version of A by αA. These two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

The *$n \times k$-matrix space* is the vector space over $\mathsf{R}^{n \times k}$ 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 $\mathsf{R}^{n \times n}$.

[1] Future editions will rework this sheet.


Matrix Space
Symmetric Matrices
Matrix Transpose
Subspaces
Matrices
Vectors
N-Dimensional Space
Distance
Space Distance
Plane Distance
Interval Length
Intervals
Real Plane
Real Line
Real Space
Integral Line
Real Order
Geometry
Real Numbers
Fields
Rational Numbers
Groups
Sequences
Integer Arithmetic
Integer Additive Inverses
Set Numbers
Natural Additive Identity
Natural Multiplicative Identity
Inverse Elements
Integer Sums
Direct Products
Finite Sets
Identity Elements
Arithmetic
Element Functions
Equivalent Sets
Algebras
Natural Powers
Integer Products
Operations
Function Inverses
Natural Products
Integer Numbers
Family Unions and Intersections
Families
Equivalence Relations
Function Composites
Function Images
Natural Sums
Natural Order
Functions
Recursion Theorem
Relations
Peano Axioms
Cartesian Products
Natural Induction
Generalized Set Dualities
Set Powers
Natural Numbers
Set Unions and Intersections
Set Dualities
Unordered Triple
Intersection of Empty Set
Successor Sets
Partitions
Set Complements
Pair Unions
Set Intersections
Ordered Pairs
Pair Intersections
Set Unions
Set Differences
Empty Set
Unordered Pairs
Set Specification
Set Inclusion
Standardized Accounts
Accounts
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects