Why

We can generalize the real general linear groups to vector spaces over $\mathbf{C}$.

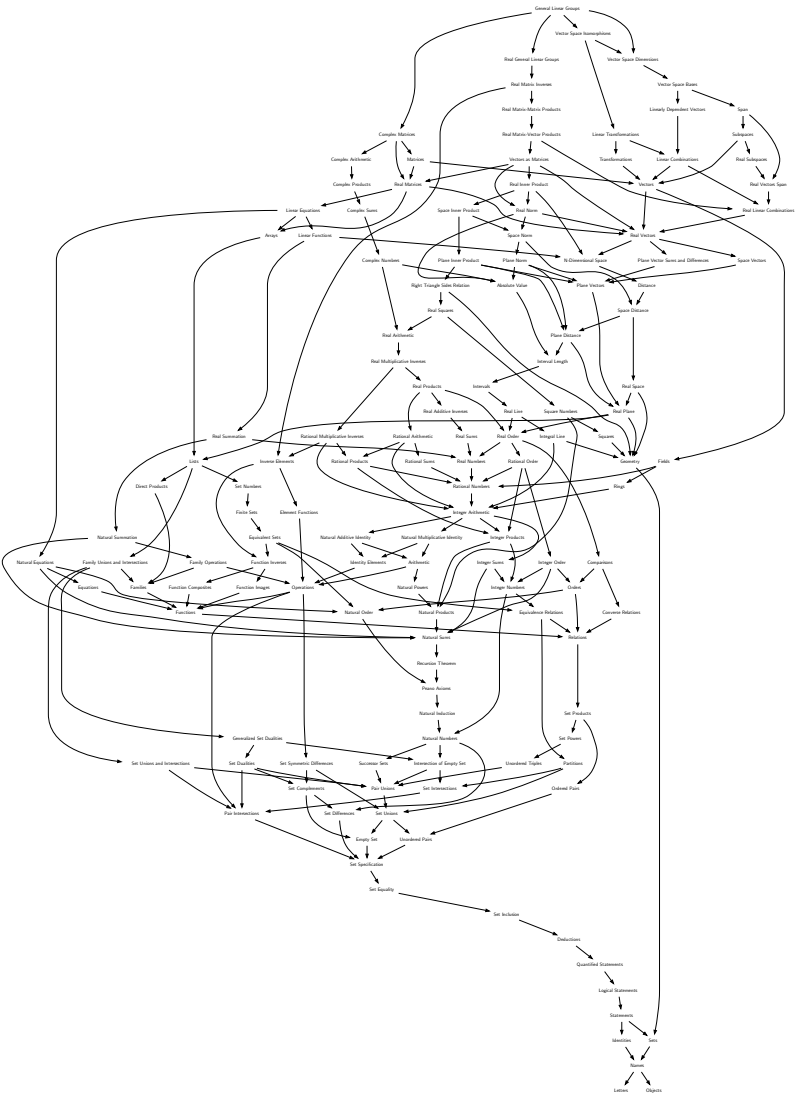
Definition

Suppose V is a vector space over the field $\mathbf{C}$ of complex numbers. The set of isomorphisms of V onto itself is a group, called the *general linear group*, under the operation of composition. If V has dimension n, then the general linear group can be identified with the invertible $n \times n$ complex matrices in the usual way.

Notation

We denote by $GL(V)$ the general linear group of isomorphisms of V onto itself. If $f \in GL(V)$, and V has a finite basis $e_1, \ldots, e_n \in V$, then f has corresponding matrix representation $A \in \mathbf{C}^{n \times n}$ given by

$$A = \begin{bmatrix} f(e_1) & \cdots & f(e_n) \end{bmatrix}.$$


General Linear Groups
Vector Space Isomorphisms
Real General Linear Groups
Vector Space Dimensions
Real Matrix Inverses
Vector Space Bases
Real Matrix-Matrix Products
Linearly Dependent Vectors
Span
Complex Matrices
Real Matrix-Vector Products
Linear Transformations
Subspaces
Complex Arithmetic
Matrices
Vectors as Matrices
Transformations
Linear Combinations
Real Subspaces
Complex Products
Real Matrices
Real Inner Product
Vectors
Real Vector Span
Linear Equations
Complex Sums
Space Inner Product
Real Norm
Real Linear Combinations
Angle
Linear Functions
Space Norm
Real Vectors
Complex Numbers
Plane Inner Product
Plane Norm
N-Dimensional Space
Plane Vector Sums and Differences
Space Vectors
Right Triangle Sides Relation
Absolute Value
Plane Vectors
Distance
Real Squares
Space Distance
Real Arithmetic
Plane Distance
Real Multiplication Inverses
Interval Length
Real Products
Intervals
Real Space
Real Addition Inverses
Real Line
Square Numbers
Real Plane
Real Summation
Rational Multiplication Inverses
Rational Arithmetic
Real Sums
Real Order
Integral Line
Squares
Units
Inverse Elements
Rational Products
Rational Sums
Real Numbers
Rational Order
Geometry
Fields
Direct Product
Set Numbers
Rational Numbers
Rings
Finite Sets
Element Functions
Integer Arithmetic
Natural Summation
Equivalent Sets
Natural Addition Identity
Natural Multiplication Identity
Integer Products
Natural Recursion
Family Unions and Intersections
Family Operations
Function Inverses
Identity Elements
Arithmetic
Integer Sums
Integer Order
Comparisons
Accumulators
Families
Function Composition
Function Image
Generators
Natural Powers
Integer Numbers
Orders
Functions
Natural Order
Natural Products
Equivalence Relations
Converse Relations
Natural Sums
Relations
Recursion Theorems
Peano Axioms
Natural Induction
Set Products
Generalized Set Duality
Natural Numbers
Set Powers
Set Unions and Intersections
Set Duality
Set Symmetric Differences
Successor Sets
Intersection of Empty Set
Unordered Triples
Partitions
Set Complements
Pair Unions
Set Intersections
Ordered Pairs
Pair Intersections
Set Differences
Set Unions
Empty Set
Unordered Pairs
Set Specification
Set Equality
Set Inclusion
Deduction
Quantified Statements
Logical Statements
Statements
Identities
Sets
Issues
Letters
Objects