Why

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

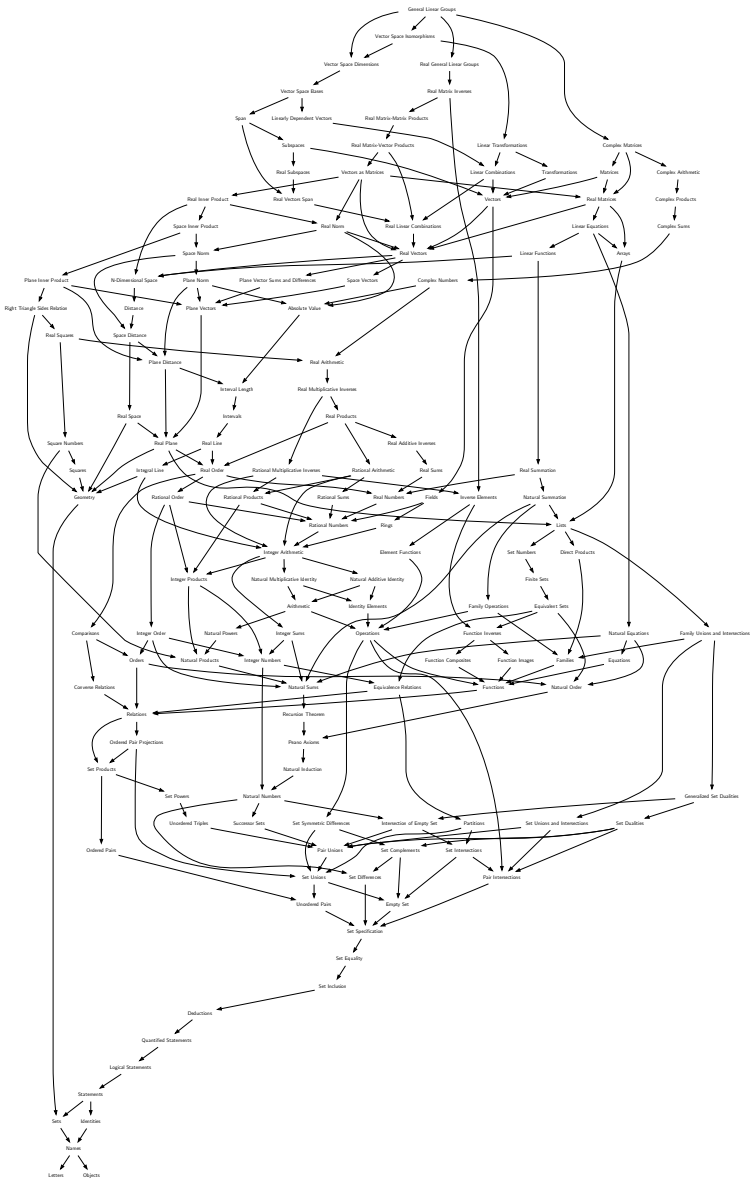
Definition

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 Homomorphisms
Vector Space Dimensions
Real General Linear Groups
Vector Space Bases
Real Matrix Inverses
Span
Linearly Dependent Vectors
Real Matrix-Matrix Products
Subspaces
Real Matrix-Vector Products
Linear Transformations
Complex Matrices
Real Subspaces
Vectors as Matrices
Linear Combinations
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Real Inner Product
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Complex Products
Space Inner Product
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Linear Equations
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Plane Inner Product
N-Dimensional Space
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Plane Vector Sums and Differences
Space Vectors
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Right Triangle Sides Relation
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Real Line
Real Addition Inverses
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Integral Line
Real Order
Rational Multiplication Inverses
Rational Arithmetic
Real Sums
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Rational Order
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Fields
Inverse Elements
Natural Summation
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Integer Arithmetic
Element Functions
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Direct Products
Integer Products
Natural Multiplicative Identity
Natural Additive Identity
Finite Sets
Arithmetic
Identity Elements
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Integer Order
Natural Powers
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Natural Equations
Family Unions and Intersections
Orders
Natural Products
Integer Numbers
Function Compositions
Function Images
Families
Equations
Converse Relations
Natural Sums
Equivalence Relations
Functions
Natural Order
Relations
Recursive Theorem
Ordered Pair Projections
Peano Axioms
Set Products
Natural Induction
Set Powers
Natural Numbers
Generalized Set Dualities
Unordered Triples
Successor Sets
Set Symmetric Differences
Intersection of Empty Set
Partitions
Set Unions and Intersections
Set Dualities
Ordered Pairs
Pair Unions
Set Complements
Set Intersections
Set Unions
Set Differences
Pair Intersections
Unordered Pairs
Empty Set
Set Specification
Set Equality
Set Inclusion
Deductions
Quantified Statements
Logical Statements
Statements
Sets
Identities
Name
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