**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
Vector Space Dimension
Vector Space Bases
Span
Subspaces
Linearly Dependent Vectors
Linear Transformations
Complex Matrices
Real Subspaces
Linear Combination
Transformations
Matrices
Complex Arithmetic
Real Vector Span
Vectors
Real Matrices
Complex Products
Real Linear Combinations
Linear Equations
Plane Vector Sums and Differences
Real Vectors
Arrays
Linear Functions
Space Vectors
N-Dimensional Space
Plane Vectors
Distance
Complex Sums
Space Distance
Complex Numbers
Plane Distance
Absolute Value
Real Arithmetic
Interval Length
Real Multiplication Inverses
Real Space
Intervals
Real Products
Real Plane
Real Line
Real Additive Inverses
Geometry
Integral Line
Real Summation
Real Order
Real Sums
Rational Arithmetic
Rational Multiplication Inverses
Fields
Real Numbers
Rational Sums
Rational Order
Rational Products
Rings
Rational Numbers
Lists
Integer Arithmetic
Set Numbers
Natural Additive Identity
Natural Multiplicative Identity
Integer Products
Direct Products
Finite Sets
Identity Elements
Arithmetic
Natural Powers
Integer Order
Integer Sums
Family Unions and Intersection
Comparisons
Family Operations
Inverse Elements
Equivalent Sets
Natural Summation
Natural Products
Integer Numbers
Family
Operations
Function Composites
Element Functions
Function Inverses
Equations
Order
Natural Equations
Natural Sums
Converse Relations
Function Images
Functions
Natural Order
Equivalence Relations
Recursion Theorem
Relations
Peano Axioms
Set Products
Natural Induction
Generalized Set Dualities
Set Powers
Natural Numbers
Set Unions and Intersections
Set Dualities
Unordered Triples
Successor Sets
Intersection of Empty Set
Partitions
Set Symmetric Differences
Ordered Pairs
Pair Unions
Set Intersections
Set Complements
Pair Intersections
Set Unions
Set Differences
Unordered Pairs
Empty Set
Set Specification
Set Equality
Set Inclusion
Standardized Accounts
Accounts
Deduction
Quantified Statements
Logical Statements
Statements
Sets
Identities
Names
Letters
Objects