



## 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  $e_1, \dots, e_n \in V$ , then  $f$  has corresponding matrix representation  $A \in \mathbf{C}^{n \times n}$  given by

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



