



**Definition**

Suppose  $G$  is a finite group with identity  $1$  and suppose  $V$  is a vector space over the field  $\mathbf{C}$  of complex numbers. A *linear representation*  $\rho : G \rightarrow GL(V)$  of  $G$  in  $V$  is a group homomorphism from  $G$  to the general linear group  $GL(V)$ . Given  $\rho$ , we call  $V$  a *representation space* (or *representation*) of  $G$

Suppose  $V$  has finite dimension  $n$ . In this case, we call  $n$  the *degree* of the representation  $\rho$ . Given a basis  $e_1, \dots, e_n$  of  $V$ ,



