

Character Tables for Representations of Finite Groups

Jared Stewart

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Table of contents

- 1 Introduction
- 2 Section no.1
 - Subsection no.1.1
- 3 Section no. 2
 - Lists I
 - Lists II
- 4 Section no.3
 - Tables
- 5 Section no. 4
 - blocs
- 6 Section no. 5
 - split screen

Group Representations

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One may wonder more generally: Given an abstract group G , which objects X does G act on? This is the basic question of representation theory, which attempts to classify all such X up to isomorphism.

Group Actions

Definition

A **(left) group action** of a group G on a set X is a map $\rho: G \times X \rightarrow X$ (written as $g \cdot a$, for all $g \in G$ and $a \in A$) that satisfies the following two axioms:

$$1 \cdot x = x \qquad \forall x \in X \qquad (1)$$

$$(gh) \cdot x = g \cdot (h \cdot x) \qquad \forall g, h \in G, x \in X \qquad (2)$$

The Definition of a Representation

Definition

Let G be a group, let F be a field, and let V be a vector space over F . A **linear representation** of G is an action of G on V which preserves the linear structure of V , i.e. an action of G on V such that

$$g \cdot (v_1 + v_2) = g \cdot v_1 + g \cdot v_2 \quad \forall g \in G, v_1, v_2 \in V \quad (3)$$

$$g \cdot (kv) = k(g \cdot v) \quad \forall g \in G, v \in V, k \in F \quad (4)$$

The Definition of a Representation

Definition (Alternative definition)

Let G be a group, let F be a field, and let V be a vector space over F . A **linear representation** of G is any group homomorphism $\rho: G \rightarrow GL(V)$. If we fix a basis for V , we get a representation in the previous sense.

Title

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unnumbered lists

- Introduction to \LaTeX
- Course 2
- Termpapers and presentations with \LaTeX
- Beamer class

lists with pause

- Introduction to L^AT_EX

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- Introduction to \LaTeX
- Course 2

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numbered lists

- ① Introduction to \LaTeX
- ② Course 2
- ③ Termpapers and presentations with \LaTeX
- ④ Beamer class

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- 1 Introduction to \LaTeX

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- ① Introduction to \LaTeX
- ② Course 2

numbered lists with pause

- ➊ Introduction to \LaTeX
- ➋ Course 2
- ➌ Termpapers and presentations with \LaTeX

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- ③ Termpapers and presentations with \LaTeX
- ④ Beamer class

Tables

| Date | Instructor | Title |
|----------|--------------|----------------------------------|
| WS 04/05 | Sascha Frank | First steps with \LaTeX |
| SS 05 | Sascha Frank | \LaTeX Course serial |

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blocs

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splitting screen

- Beamer
- Beamer Class
- Beamer Class Latex

| Instructor | Title |
|--------------|--|
| Sascha Frank | L ^A T _E X Course 1 |
| Sascha Frank | Course serial |