Reading and Meeting plans

WDRP - Representation Theory

1 Week 0: WDRP Kick-off Meeting

a) Project planning

- Textbook: Representing Finite Groups: A semisimple Introduction
- LROFG = "Linear Representations of Finite Groups" by Serre
- William Meetings: Thursday 2:30pm-3:30pm
- Aman Meetings: Friday 12:00pm-1:00pm

1.1 To-Do

a) Read sections 1.1-1.3 in textbook

2 Week 1: Examples of Representations

a) Discussion and Questions from reading

b) Review some group theory: Group Actions, Klein four-group, Dihedral group notation

c) Introduce left regular representation of $\mathbb{Z}_3$ and D_3

d) Introduce Example of isomorphic D_3 representations

2.1 To-Do

a) Read sections 1.3-1.4 in textbook

b) Read "Tensor Product" blog post (link: https://www.math3ma.com/blog/the-tensor-product-demystified)

c) Week 1 Exercises

2.1.1 Resources

a) Videos for examples of representations:

- Representations of Finite Groups | Definitions and simple examples. by Michael Penn
- Representations of Finite Groups | A few more common examples. by Michael Penn

3 Week 2: Direct Sums and Tensor Products

1. Discussion and Questions from reading.
2. Discuss Exercises
3. Determine matrix representation for tensor product
4. Symmetric power and Alternating power.

3.1 To-Do

a) Read sections 1.5-1.6 from book. But skip section on Subspace annihilators

b) Week 2 Exercises

4 Week 3: Dual Representations and Hom

1. Discussion and Questions from reading.
2. Discuss Exercises
3. Inner product definition of Dual representation
4. General Hom spaces and notation
5. Tensor-Hom relation for vector spaces
6. Hom representation and intertwining operators

4.1 To-Do

a) Read sections 1.7 and 1.8 entirely.

b) Week 3 Exercises.

5 Week 4: Irreducible and Indecomposable Representations

1. Discussion and Questions from reading.
2. Discuss Exercises

5.1 To-Do

1. Linear representations of finite groups (LROFG)
   a) Week 4 exercises
   b) Read Theorem 1 with proof (pg. 6), Theorem 2 with proof (pg. 7), Section 2.1 (excluding prop 3) From LROFG
   c) prep midquarter lightning talk

6 Week 5: Maschke's theorem

1. Linear representations of finite groups (LROFG)
   (a) Week 5 Exercises
   (b) read Section 2.1 and 2.2 from LROFG

7 Week 6: Characters

1. Week 5 Exercises cont'd
2. read Section 2.1 and 2.2 from LROFG

8 Week 7: Characters cont'd

1. Week 5 Exercises cont'd
2. read Section 2.3 and 2.4 from LROFG
3. Work on exercises from previous weeks

9 Week 7: Characters cont'd

1. Week 5 Exercises cont'd and previous weeks
2. read Section 2.5 and 2.6 from LROFG

10 Week 8: Characters cont'd

1. Character table exercises
2. Prep final presentation slides

11 Week 9: Characters cont'd

1. Character table exercises
2. Prep final presentation slides

12 Week 10: No Meeting, prep slides