

Project 1: The dihedral groups

Due: Tuesday, May 1

This project should be written in the form of a short paper. You do not need to provide the basic definitions of the course (representation, module, etc.), but you should be sure to state and reference any results you use (you may use without proof any result up through Chapter 11 in the book), and make sure all the notation you use is defined. The idea of this project is that you can read this paper ten years from now and still understand the ideas, logic, and results.

Goal. *Let D_{2n} be the dihedral group with $2n$ elements.*

- 1. Classify the irreducible representations of D_{2n} . Be sure to justify why they are representations, why they are irreducible, and why you have all of them.*
- 2. Construct the corresponding irreducible D_{2n} -modules.*
- 3. Give two examples that illustrate what can happen, and compute the character tables for these examples.*

Hint: If V is an irreducible D_{2n} -module, then $\dim(V)$ is either 1 or 2.