

Advanced Algebra I

Homework 5

due on Oct.24, 2003

Part A.

- (1) Show that $D_n = \langle x, y | x^n = y^2 = 1, (xy)^2 = 1 \rangle$.
- (2) Show that $Q_8 = \langle x, y | xyx = y, x^2 = y^2 \rangle$, where Q_8 is the group of quaternions of order 8
- (3) Let ρ be a representation of G . Show that $\det \rho$ is a representation of G of degree 1.
- (4) Determine all irreducible representation of a cyclic group C_n .

Part B.

- (1) Prove that G is abelian if and only if G admits a faithful representation by diagonal matrices over \mathbb{C} .
- (2) Determine the character table of Q_8 and D_4 .