

Problem 24 (Character table of D_4)

Consider the dihedral group $D_4 = \langle r, s \mid r^4 = s^2 = (rs)^2 = 1 \rangle$:

- (1) Identify its five conjugacy classes and define the corresponding class operators; (*Hint: Consider the different symmetry operations of a square*)
- (2) Work out its class multiplication table;
- (3) Diagonalize the class operators (with the help of some software such as python or Mathematica[©] if needed) to determine its character table.