

**Problem 29**

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;
- (2) Work out its class multiplication table;
- (3) Diagonalize the class operators to determine its character table. You should recover the character table here <sup>1</sup>. Identify a minimal set of CSCO.

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<sup>1</sup><http://symmetry.jacobs-university.de/cgi-bin/group.cgi?group=304&option=4>