THE SUBGROUPS OF M_{24}, OR HOW TO COMPUTE THE TABLE OF MARKS OF A FINITE GROUP

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Abstract. Let G be a finite group. The table of marks of G arises from a characterization of the permutation representations of G by certain numbers of fixed points. It provides a compact description of the subgroup lattice of G and enables explicit calculations in the Burnside ring of G. In this article we introduce a method for constructing the table of marks of G from tables of marks of proper subgroups of G. An implementation of this method is available in the GAP language. These computer programs are used to construct the table of marks of the sporadic simple Mathieu group M_{24}. The final section describes how to derive information about the structure of G from its table of marks via the investigation of certain Möbius functions and the idempotents of the Burnside ring of G. Tables with detailed information about M_{24} and other groups are included.