
The Module Isomorphism Problem for Finite Rings and Related Results

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Abstract Let R be a finite ring and let M, N be two finite left R -modules. We present two distinct deterministic algorithms that decide in polynomial time whether or not M and N are isomorphic, and if they are, exhibit an isomorphism. As by-products, we are able to determine the largest isomorphic common direct summand between two modules and the minimum number of generators of a module. By not requiring R to contain a field, avoiding computation of the Jacobson radical and not distinguishing between large and small characteristic, both algorithms constitute improvements to known results. We have not attempted to implement either of the two algorithms, but we have no reason to believe that they would not perform well in practice.

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