THE COMPLEXITY OF THE EQUIVALENCE PROBLEM FOR COMMUTATIVE RINGS

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The equivalence problem over finite rings asks whether or not a polynomial over a given finite ring is identically 0, i.e., whether or not the polynomial attains value 0 for every substitutions from the ring. We investigate the complexity of this problem.

The equivalence problem has two versions for finite rings depending on the form of the input polynomial. In the original version the input polynomial can have any form, and in the sigma version the input polynomial is written as a sum of monomials. Lawrence and Willard conjectured that for a finite ring $R$ with Jacobson radical $J$ the complexity of the sigma equivalence problem is in P if $R/J$ is commutative, and coNP-complete otherwise. We confirm this conjecture for commutative rings.

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