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Counting Irreducible Polynomials over $\mathbb{Z}_n$

It is commonly known that there are $\binom{n}{2}$ irreducible, quadratic polynomials over $\mathbb{Z}_n$ when n is a prime. Then it is natural to ask how many irreducible quadratics there are over $\mathbb{Z}_n$ without the condition that n is prime. Counting methods for the case where n is prime, rely on field axioms which $\mathbb{Z}_n$ does not generally satisfy. In this thesis, we relate counting reducible, quadratic polynomials to the simpler problem of counting squares. In the construction of this count, we find an algorithm to generate all quadratic polynomials over $\mathbb{Z}_n$ and categorize them as reducible or irreducible. This algorithm is computationally less expensive than the naive cubic algorithm for generating all irreducible quadratics.