# Solutions to K. Ireland and M. Rosen's $A \ Classical \ Introduction \ to \ Modern \ Number \ Theory$

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ABSTRACT. This document contains solutions to the exercises of Kenneth Ireland and Michael Rosen's A Classical Introduction to Modern Number Theory.

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# Unique Factorization

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# Applications of Unique Factorization

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### Congruence

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# The Structure of $U(\mathbf{Z}/n\mathbf{Z})$

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# Quadratic Reciprocity

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### Quadratic Gauss Sums

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### Finite Fields

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### Gauss and Jacobi Sums

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# Cubic and Biquadratic Reciprocity

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### The Zeta Function

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### Algebraic Number Theory

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### Quadratic and Cyclotomic Fields

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### The Stickelberger Relation and the Eisenstein Reciprocity Law

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### Bernoulli Numbers

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### Dirichlet L-functions

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# **Diophantine Equations**

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# Elliptic Curves

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