

Applications of real Calculus in Number Theory

Thesis Abstract

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The aim of this Bachelor's thesis is to inquire into the applications of real calculus in the field of number theory. The relationship between real calculus and number theory may not be readily evident, as number theory conventionally relies on algebraic and combinatorial methods. However, the tools and techniques of real calculus present a new vantage point and offer valuable perspectives into the complex patterns and structures inherent in number theory.

We can investigate various aspects of number theory by applying the principles of real calculus, such as prime numbers, transcendental numbers, arithmetic functions and the distribution of integers. Real calculus plays an important role in the study of transcendental numbers. As techniques like limits and integrals are used to define and analyse their properties alongside with Liouville numbers. One significant application explored in this thesis is the connection between calculus and prime numbers. The prime number theorem, a fundamental result in number theory, provides an estimate for the distribution of prime numbers. Finally, the focus shifts to the arithmetic functions, which are functions defined on the set of positive integers. We explored methods to determine the LCM of prime divisors, also Dirichlet Hyperbola method. The insights gained from this research have the potential to contribute to the further development of number theory and provide a deeper understanding of the fundamental properties of integers and prime numbers.