Valuation Theory

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Abstract

Valuation theory is a fundamental tool in commutative algebra that provides a powerful framework for understanding the structure of a specific type of local rings and their field of fractions.

This theory plays a crucial role in number theory, algebraic geometry, and field theory. It helps in understanding local properties of fields, leading to the development of concepts such as valuation rings, discrete valuations, and completions of fields. Notably, valuation theory underpins the construction of p-adic numbers, which have significant applications in solving Diophantine equations and studying rational solutions.

In this presentation, we introduce the basic definitions of valuations, valuation rings, discrete valuation rings (DVRs), and finally, the Weak Approximation theorem, which is a generalization of the Chinese Remainder theorem