

Fachbereich Mathematik & Statistik



Schwerpunkt Reelle Geometrie und Algebra

Seminar im Wintersemester 2011/2012

p-adically Closed Fields

Prof. Dr. S. Kuhlmann

Mitarbeiter: Dr. Lorna Gregory

2-stündig, Di. 14.00 – 16.00 Uhr (oder n.V.)

The topic of this seminar is the field of p -adic numbers, \mathbb{Q}_p , and its algebraic extensions. Like the real field, \mathbb{Q}_p is a completion of \mathbb{Q} with respect to an absolute value. The absolute value used, is the p -adic absolute value

$$|x|_p := p^{-k}$$

where k is the exponent of p , when we write $x = p^k n/m$ with m, n coprime to p . The p -adic absolute values together with the Euclidean absolute value are (up to equivalence) all the possible non-trivial absolute values on \mathbb{Q} . The field \mathbb{Q}_p is of great importance to number theory.

The aim of this seminar is to prove quantifier elimination for \mathbb{Q}_p in the language of rings extended by a unary predicate for n th powers. This result is the p -adic equivalent of the Tarski-Seidenberg theorem for the real ordered field (quantifier elimination for the theory of real closed fields). The underlying algebraic theory used to achieve this result is the theory of p -valued fields. In the analysis of \mathbb{Q}_p , p -valued fields should be seen as parallel to ordered field in the analysis of \mathbb{R} .

Knowledge of Valuation theory and Model theory will be helpful, however Dr. Lorna Gregory will present a summary of the necessary background material. This seminar will follow the book "Formally p -adic Fields" by Prestel and Roquette, covering the first 5 chapters. The material will be organised into 14 seminars.

Voraussetzungen:

Das Seminar richtet sich an Studierende des 5., 7. und 9. Semesters

Zielgruppe:

BA, MA, D

Vorbesprechung:

Dienstag, 18. Oktober 2011, 14.00 Uhr c.t. im Raum F433