Lecture I (The Cohen Prize Lecture):

“From sequences to dynamics: Fibonacci, Fermat and Skolem”

Abstract: Some very elementary sequences of numbers exhibit unexpected and thus far not completely understood behaviors. For example, when the Fibonacci sequence is computed modulo some natural number, it repeats, but determining the length of the period is closely related to difficult problems in number theory, such as the finally resolved Last Theorem of Fermat. On the other hand, certain other properties of these sequences and their relatives, namely those which satisfy a linear recurrence relation, and known to be very regular and the regularities were revealed by p-adic analysis already in the 1930s. With this lecture, I will describe some of these elementary but still open problems as well as the p-adic method of Skolem.

Thursday, May 23
Pizza at 6:00 in the Barn (Ry 352)
Lecture at 7:30 (Eckhart 206)
Seniors are especially invited!

The Paul R. Cohen Prize is awarded annually to the graduating senior(s) who has(have) achieved the best record(s) in mathematics. We will also recognize those graduating seniors who have achieved honors in mathematics.

Lecture II (Departmental Colloquium):

“Diophantine geometry of algebraic dynamics”

Abstract: Generalizing from the case of sequences defined by linear recurrence relations, one may consider sequences obtained by iteratively applying polynomials. Several authors have raised a conjecture about iterates of polynomial functions inspired by Mordell’s conjecture (Faltings’ Theorem) about rational points on curves. Specifically, let \( f_1, \ldots, f_n \) be a sequence of \( n \) polynomials in \( n \) variables over the complex numbers. Define a function \( \Phi : \mathbb{C}^n \to \mathbb{C}^n \) by \( (a_1, \ldots, a_n) \mapsto (f_1(a_1, \ldots, a_n), \ldots, f_n(a_1, \ldots, a_n)) \). The dynamical Mordell-Lang conjecture asserts that for any such function and any subset \( V \subseteq \mathbb{C}^n \) defined by the vanishing of finitely many polynomials, and any starting point \( (a_1, \ldots, a_n) \), the set \( \{ m \in \mathbb{N} \mid \Phi^m(a_1, \ldots, a_n) \in V \} \) is a finite union of points and arithmetic progressions. I will explain with some elementary examples why this conjecture should be interesting and plausible; how Skolem's method for studying linear recurrence relations may be applied to the problem; and then why it seems that the conjecture may be too optimistic.

Friday, May 24
Lecture at 3:00 P.M. (Eckhart 206)

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