Computability Seminar

UNIVERSITY OF NOTRE DAME
Department of Mathematics

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Thursday, September 10, 2015
3:00 pm
Room: 125 Hayes-Healy Hall

Title: Understanding the Paris-Harrington Theorem, Part I

Abstract:
Call a finite set of natural numbers X *relatively large* if $|X| \geq min(X)$. Given natural numbers M, e, r, and k, let $M \stackrel{*}{\to} (k)^e_r$ denote the statement that for every partition $P : [M]^e \to r$ of the size e subsets of M into r colors, there is a relatively large set $X \subseteq M$ that is homogeneous for P. It is not difficult to show, using the infinite Ramsey theorem and a compactness argument, that

$$(*) \quad (\forall e, r, k)(\exists M)(M \stackrel{*}{\to} (k)^e_r).$$

However, Paris and Harrington[1] showed that the statement $(*)$ cannot be proved in Peano arithmetic. We will try to present a clear explanation of their proof.

[1]A Mathematical Incompleteness in Peano Arithmetic, Handbook of Mathematical Logic, 1977