Michigan Math Club

Thursday at 4pm in the Nesbitt Room
Free Pizza and Pop

Cookie Monster meets the Fibonacci Numbers; mmmmmm – theorems!

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Abstract for 30 November 2017

A beautiful theorem of Zeckendorf states that every positive integer can be written uniquely as a sum of non-consecutive Fibonacci numbers. Once this has been shown, it is natural to ask how many Fibonacci numbers are needed. Lekkerkerker proved that the average number of such summands needed for integers in $[F_n, F_{n+1})$ is $n/(\phi^2 + 1)$, where ϕ is the golden mean. We present a combinatorial proof of this through the cookie problem and differentiating identities, and further prove that the fluctuations about the mean are normally distributed. These techniques apply to numerous generalizations, which we'll discuss. This is joint work with many students (including many Wolverines); as time permits I'll discuss current research.