

Western Illinois University

Math Club

Wednesday March 9

Morgan 202

5:30 pm

Continued Fractions and Ergodic Theory

James Dibble

Each irrational number x can be uniquely represented as a continued fraction of the form

$$x = a_0 + \frac{1}{a_1 + \frac{1}{a_2 + \frac{1}{a_3 + \dots}}}$$

for a sequence of integers a_0, a_1, a_2, \dots that, with the possible exception of a_0 , are all positive. In this talk, it will be shown that there exists a number $K = 2.68454\dots$ with the following astonishing property: For almost every irrational number x , the geometric mean of the numbers a_1, a_2, a_3, \dots in its continued fraction representation satisfies

$$K = \lim_{n \rightarrow \infty} (a_1 a_2 \cdots a_n)^{1/n}.$$

This number is called Khinchin's constant. The proof of its existence uses the celebrated Birkhoff ergodic theorem, which will also be discussed.

Join Math Club for this talk along with pizza and refreshments. If you have any questions, contact Malone Wall at ma-wall@wiu.edu