The University of Mississippi

Department of Mathematics

AMS Graduate Student Seminar

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Distribution of the Number of Prime Factors of an Integer

Friday, April 22, 2022,
4:00 p.m. in Hume 321

Abstract: The distribution of the prime numbers has always intrigued number theorists. As our understanding of this distribution has evolved, so too have our methods of analyzing the related arithmetic functions. If we let $\omega(n)$ denote the number of distinct prime divisors of a natural number n, then the celebrated Erdős-Kac Theorem states that the values of $\omega(n)$ are normally distributed (satisfying a central limit theorem as n varies). This result is considered the beginning of Probabilistic Number Theory.
We present a modern proof of the Erdős-Kac Theorem using a moment based argument due to Granville and Soundararajan, which we explain in full detail. We also use similar techniques to study the variance of $\omega(n)$, refining a classical result of Turán.