JAMES CUMBERBATCH

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Education

Ph.D. in Mathematics – Purdue University   2018-Expected May 2025

- Advisor: Trevor Wooley

B.A. in Mathematics – Oberlin College   2014 — 2018

- High Honors

- Undergraduate Thesis

- Minor in Computer Science

Research

Accepted

Hausdorff Dimension of Unions of Lines that Cover a Curve
Pure Appl. Funct. Anal. 8 (2023), no. 6, 1651–1659. ISSN: 2189-3756
(Joint with T. Keleti and J. Zhang)

Digitally Restricted Sets and the Goldbach Conjecture: An Exceptional Set Result
Accepted for Publication by Bulletin of the Australian Mathematical Society.

Preprints

Exact Defective Colorings of Graphs

Joint with J. Lauri and C. Mitillos, submitted. Arxiv:2109.05255

Digitally Restricted Smooth Integers in Large Bases

Digitally Restricted Polynomial Values

In Progress

Digitally Restricted Smooth Integers in Base 10

An Application of Moore's Law to Waring's Problem

Conferences Attended

ELAZ - Elementary and Analytic Number Theory, Adam Mickiewicz University, Poznań, Poland	2022
Journeè Arithmetique, University of Lorraine, Nancy, France	2023
SRNTC - Southern Regional Number Theory Conference, LSU, Baton Rouge, Lousiana	2024
CANT - Combinatorial and Additive Number Theory (Zoom), CUNY, NYC, NY	2024

Conference Talks Given

Smooth Numbers with Restricted Digits	Southern Regional Number Theory Conference 2024
Digitally Restricted Sets and the Goldbach Conjecture	Combinatorial and Additive Number Theory 2024
Smooth Numbers with Restricted Digits	Canadian Number Theory Association 2024

Seminar Talks Given

Smooth Numbers with Restricted Digits   Purdue Analytic Number Theory and Harmonic Analysis Seminar 2024

Asymptotics of Prime Counting Functions   Purdue Student Analytic Number Theory Seminar 2023

Dirichlet's Theorem on Primes in Arithmetic Progressions Purdue Student Analytic Number Theory Seminar 2023

Teaching

TA for MA166 Honors Calculus 2   Spring 2023

TA for MA262 Linear Algebra & ODEs   Spring 2024

Math Tutor   2015 — 2018

- Real Analysis

- Discrete Mathematics

- Calculus 1 & 2

- Introductory Statistics

Grading

- Differential Equations And Partial Differential   Fall 2018, Spring 2019
  Equations For Engineering And The Sciences

- Multivariate Calculus   Summer 2019

- Topics in Vector Calculus   Fall 2019

- Advanced Mathematics For Engineers And Physicists I   Fall 2020, Summer 2024,

LON-CAPA Programming   Spring 2020, Summer 2020, Spring 2021, Fall 2021, Spring 2022

Service to Department

Student Analytic Number Theory and Applications Seminar Organizer   2022 — 2023

Graduate Student Computer Representative   2023 — 2025

Math History Seminar Co-organizer   2024 — 2025

Relevant Courses Taken

Number Theory

- Arithmetic Harmonic Analysis   2020

- Analytic Number Theory 1 and 2   2020-2021

- Algebraic Number Theory   2022

- Class Field Theory   2023

- The Circle Method   2023

- Additive Combinatorics   2024

- Analytic Number Theory in Function Fields   2024

Probability

- Probability Theory 1 and 2   2019
- Large Deviations   2020

Computer Science

- Systems Programming   2016
- Algorithms   2016
- Theory of Computer Science   2017
- Advanced Algorithms   2018
- Cryptography   2023

Programming Languages Known

C

Python