

# Zachary D. Tripp

## Curriculum Vitae

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### Professional Summary

Math graduate student with extensive experience in research and teaching. Research has touched on a vast array of topics used in both pure and applied math. Currently taking coursework in deep learning and algorithms while learning practical programming skills. Developed communication skills refined through classroom lectures, research and expository talks, mentoring students, education courses, and lessons for school-age students. Involved in numerous leadership positions throughout college and graduate school, including co-organizing and co-creating educational programs for undergraduates and middle school and high school students.

### Education and Research

Fall 2017 – **Vanderbilt University**, *Mathematics Ph.D.*

Present Researching topics in number theory and combinatorics under Dr. Larry Rolen. Co-authored and submitted four research papers in combinatorics, modular forms, and analytic number theory. Co-authoring two papers in preparation, one studying optimization techniques applied to analytic number theory and one related to combinatorics. GPA 4.00.

Fall 2012 – **Tufts University**, *Bachelor of Science in Mathematics.*

Fall 2016 GPA: 3.96, Math GPA: 4.00

Summer 2015 **Summer Research Project**, *Tufts University.*

Studied topics in elliptic curves under George McNinch.

Summer 2014 **National Science Foundation Research Experience for Undergraduates**, *SHSU.*

Studied topics in non-unique factorization under Scott Chapman, resulting in two publications.

### Skills

Programming Experience **Python, MATLAB, Mathematica, C++, Unix, SageMath, LaTeX, Excel.**

Coursework **Non-linear optimization (Vanderbilt, in progress)** .

Spring 2021

Coursera **Machine Learning, Deep Learning Specialization.**

Certificates

Kaggle **Python, Intro to Machine Learning, Pandas, Intro to Deep Learning.**

Certificates

### Publications

- Kathrin Bringmann, Kevin Gomez, Larry Rolen, and Zack Tripp. "Infinite families of crank functions, Stanton-type conjectures, and unimodality". In preparation.
- Joshua Males and Zack Tripp. "Combinatorial results on  $t$ -cores and sums of squares". Submitted. arXiv:2011.09989.
- Kathrin Bringmann, Ben Kane, Larry Rolen, Zack Tripp. "Fractional partitions and conjectures of Chern-Fu-Tang and Heim-Neuhauser". Accepted, *Transaction of the American Mathematical Society*.

arXiv:2011.08874.

5. Larry Rolen, Zack Tripp, Ian Wagner. "Cranks for Ramanujan-type congruences for  $k$ -colored partitions". Submitted. arXiv:2006.16195.
4. M. Griffin, K. Ono, L. Rolen, J. Thorner, Z. Tripp, and I. Wagner. "Jensen polynomials for the Riemann Xi-function". Submitted. arXiv:1910.01227.
3. M. Alsharif, M. Gibson, D. de Laat, M. Milinovich, L. Rolen, Z. Tripp, I. Wagner. Title TBA. In preparation.
2. Scott T. Chapman and Zack Tripp. " $\omega$ -Primality in arithmetic Leamer monoids." *Semigroup Forum*. Vol. 99. No. 1. Springer US, 2019.
1. S.T. Chapman, P.A. García-Sánchez, Z. Tripp, and C. Viola. (2016). "Measuring primality in numerical semigroups with embedding dimension three". *Journal of Algebra and Its Applications*, 15(01), 1650007.

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## Awards and Grants

- Fall 2019 **Graduate Leadership Institute Travel Grant**, *Vanderbilt University*.  
Awarded a grant to attend a conference at CIRM titled "Zeta Functions" (later unable to attend)
- Spring 2016 **Norbert Wiener Award**, *Tufts University*.  
"Given on those rare occasions when a student exhibits such prodigious strength in mathematics to recall the highly unusual talents of Norbert Wiener '09"
- Spring 2016 **Donald A. Cowdery Memorial Scholarship**, *Tufts University*.  
"Awarded to juniors or seniors whose academic achievements and personal qualities of leadership and high principle have been outstanding"
- Spring 2016 **Nadia Medina Memorial Prize**, *Tufts University*.  
"Awarded to a junior or senior to recognize extraordinary contributions to collaborative learning at Tufts"
- Spring 2014 **Karno Dean's Award for Academic Excellence and Leadership**, *Tufts University*.  
"Awarded to three Tufts sophomores who show promise in academics and demonstrate leadership"
- Spring 2013 **Martin Guterman Award**, *Tufts University*.  
"Awarded by the math department to the first year student with the highest academic achievement in math"

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## Talks

- December 2020 **Palmetto Joint Arithmetic, Modularity, and Analysis Series**, "*Log-concavity for  $k$ -colored partitions*".  
Presenting on recently submitted work, proving the log-concavity of  $k$ -colored partition functions
- September 2020 **Palmetto Joint Arithmetic, Modularity, and Analysis Series**, "*Cranks for Ramanujan-type congruences for  $k$ -colored partitions*".  
Presented on recently submitted work, illustrating how it fits into questions considered historically for ranks and cranks
- February 2020 **AMS Ole Miss Graduate Student seminar**, "*Jensen Polynomials for the Riemann Xi Function*".  
Gave an invited talk about recently submitted paper
- February 2020 **Vanderbilt Graduate Student seminar**, "*Rational Points on Elliptic Curves*".  
Gave an overview talk on elliptic curves and major results in the field

- February 2020 **Vanderbilt Graduate Student seminar**, "*Generating Functions, Partitions, and Dirichlet Series*".  
Gave an overview talk on tools related to partitions and combinatorics
- September 2019 **Palmetto Number Theory Series**, "*Pair correlation and distinct zeros of Dedekind zeta functions*".  
Discussed work in preparation extending Montgomery's pair correlation results and utilizing semi-definite programming to obtain results on zeros for families of zeta functions
- September 2019 **Vanderbilt Number Theory seminar**, "*Pair correlation and distinct zeros of Dedekind zeta function*".  
Discussed work in preparation extending Montgomery's pair correlation results and utilizing semi-definite programming to obtain results on zeros for families of zeta functions
- Spring 2019 **Vanderbilt Undergraduate Seminar**, "*Fibonacci Numbers, Combinatorics, and Partitions*".
- Fall 2018 **Vanderbilt Undergraduate Seminar**, "*Using Calculus to Study Numbers*".
- Spring 2018 **Vanderbilt Undergraduate Seminar**, "*Points on Curves*".
- Fall 2017 **Vanderbilt Undergraduate Seminar**, "*Turing Computability with Turing*".
- January 2015 **Joint Mathematics Meetings**, "*Characterizing primality in numerical monoids*".  
AMS Special Session on Number Theory

## Conferences and Workshops

- 2020 **Palmetto Joint Arithmetic, Modularity, and Analysis Series**, *Virtual*.  
Attended and presented at second number theory conference of the semester
- 2020 **Palmetto Joint Arithmetic, Modularity, and Analysis Series**, *Virtual*.  
Attended and presented at local number theory series
- 2020 **Joint Mathematics Meetings**, *Denver, CO*.  
Attended talks in analytic number theory and partition theory
- 2019 **Palmetto Number Theory Series**, *UNC Charlotte*.  
Attended and presented at local number theory series
- 2019 **Analytic and Combinatorial Number Theory: The Legacy of Ramanujan**, *UIUC*.  
Attended conference honoring Bruce C. Berndt as a funded participant
- 2019 **NSF-CBMS Conference: L-functions and Multiplicative Number Theory**, *Ole Miss*.  
Funded participant for week-long conference and lecture series featuring K. Soundararajan
- 2019 **Southeast Regional Meeting on Numbers**, *UNC Greensboro*.  
Attended number theory lectures across a number of subdisciplines
- 2019 **Joint Mathematics Meetings**, *Baltimore, MD*.  
Attended talks in analytic number theory and partition theory
- 2018 **Geometry and Topology Summer School**, *University of Chicago*.  
Funded participant for week-long lecture series and problem sessions
- 2018 **AMS Spring Southeastern Sectional Meeting**, *Vanderbilt University*.  
Attended talks in algebraic geometry
- 2015 **Joint Mathematics Meetings**, *San Antonio, TX*.  
Presented talk and attended sessions on number theory

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## Professional Activities

- September 2019 – **Graduate Student Seminar.**  
Present – Co-created and co-organizing the Vanderbilt graduate student seminar
- July 2019 – **Reviewer, *Research in the Mathematical Sciences, Research in Number Theory, The Ramanujan Journal.***  
Present
- February 2019 – **Directed Reading Program, Graduate Student Organizer, Mentor.**  
Present – Organizing the newly created program and mentoring undergraduates interested in a variety of topics
- January 2019 – **Nashville Math Club, Teacher, Curriculum Creator.**  
Present – Teaching middle and high school students and creating curriculum for the new Nashville Math Club
- Fall 2017, Fall 2020 – **Certificate in College Teaching, Participant.**  
Completed Vanderbilt Center for Teaching certificate program
- August 2017 – **Graduate Student Committees.**  
Present – Member of Graduate Student Tea, Undergraduate Seminar, Prospective Graduate Student Visits, Graduate Student Council, and other such departmental committees

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## Teaching

- Spring 2021 **MATH 1300 Teaching Assistant, Vanderbilt University.**  
Teaching assistant for first-semester calculus course
- Fall 2020 **MATH 1005 Instructor, Vanderbilt University.**  
Instructor of record for pre-calculus course using flipped classroom model
- Spring 2020 **MATH 1201 Instructor, Vanderbilt University.**  
Instructor of record for second-semester calculus course
- Fall 2019 **MATH 1005 Instructor, Vanderbilt University.**  
Instructor of record for pre-calculus course
- Spring 2019 **MATH 1300 Teaching Assistant, Vanderbilt University.**  
Teaching assistant for first-semester calculus course
- Fall 2018 **MATH 1301 Teaching Assistant, Vanderbilt University.**  
Teaching assistant for second-semester calculus course

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## Mentoring

- Spring 2019, Fall 2019, Fall 2020, Spring 2021 – **Kevin Gomez, Vanderbilt University.**  
Worked with student through "Introduction to Analytic Number Theory" by Apostol in Directed Reading Program; currently working with student on research projects in partition theory
- Spring 2020 – **Charlie Overton, Vanderbilt University.**  
Worked with student on topological graph theory and graph coloring in Directed Reading Program
- Fall 2019 – **Ariel Herrera, Vanderbilt University.**  
Worked with student through first few chapters of "Introduction to the Theory of Computation" by Sipser in Directed Reading Program