Jacob Lehmann Duke

Curriculum Vitae, 2025

PROFILE

Pure math doctoral candidate at Dartmouth College. Williams College class of 2024, 3.99 unweighted GPA. Math Major and Jewish Studies Minor with particular interests in Algebra, Number Theory, and teaching. Avid runner, backpacker, and cyclist. American citizen from Berkeley, CA.

EDUCATION

Currently enrolled in Dartmouth College PhD Program in Pure Mathematics (2024-2029)
BA with Highest Honors in Mathematics from Williams College (2020-2024)
The College Preparatory School, Oakland CA (2016-2020)
Prospect Sierra Elementary and Middle School, El Cerrito, CA (2007-2016)

PUBLICATIONS AND PREPRINTS

- "Ergodicity and Algebraicity of the Fast and Slow Triangle Maps," https://arxiv.org/abs/2409.05822
  - Submitted February 2025 to the journal "Ergodic Theory and Dynamical Systems."
- "An Invitation to Fibonacci Digits," https://arxiv.org/abs/2412.09750
  - Accepted for publication in the Fibonacci Quarterly, Feb 2025.
- "Distinct Angles and Angle Chains in Three Dimensions," https://arxiv.org/abs/2208.13284
  - Published in the Discrete Mathematics & Theoretical Computer Science Journal, February 2023: https://dmtcs.episciences.org/paper/view/id/10976
- "Toward the Gaussianity of Random Zeckendorf Games," https://arxiv.org/abs/2210.11038
  - Published in the conference proceedings for the Combinatorial and Additive Number Theory Conference, May 2023
- "Topological Methods in Zero-Sum Ramsey Theory," https://arxiv.org/abs/2310.17065
  - Completed October 2023, recently submitted to Forum of Math, Sigma.

RESEARCH AND TEACHING EXPERIENCE

- Mathematics Honors Thesis in dynamical systems / multidimensional continued fraction theory with Professor Thomas Garrity
  - Thesis manuscript: https://arxiv.org/abs/2409.05822
- Geometry and Topology in a Discrete Setting REU participant, Carnegie Mellon University summer 2023
  - Research results include: https://arxiv.org/abs/2310.17065
- SMALL REU participant (Probability and Number Theory group with Steven J. Miller) at Williams, Summer 2022
  - Research results include: https://dmtcs.episciences.org/paper/view/id/10976
- Graduate teaching assistant for Math 8 (multivariable calculus), Winter 2025 (Dartmouth)
- Graduate teaching assistant for Math 3 (differential calculus), Fall 2024 (Dartmouth)
- Teaching assistant for Galois Theory: Spring 2024 (Williams)
- Teaching assistant for Real Analysis: Fall 2023 (Williams)
- Teaching assistant for Abstract Algebra: Spring 2023, Spring 2022, and Fall 2021 (Williams)
- Teaching assistant for Multivariable Calculus: Fall 2022 (Williams)

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- Freelance math tutor in person and via Zoom, 2017-2025
- Volunteered with the Partners Program, tutoring low-income middle school students in Oakland and providing individualized support to foster academic growth and confidence, summer 2020

POSITIONS HELD

- Williams College Student Math Stat Advisory Board President, Spring 2023
- Williams College Student Math Stat Advisory Board Vice President, Fall 2022
- Williams College varsity cross country team captain, Fall 2023
- Berkeley Path Wanderers Association (BPWA) Walk Coordinator, 2016-2020
  - Author of "Step It Up: An Adventurer's Guide to 41 Walks in Berkeley and Beyond," self-published and donated to BPWA in 2020
- Spring 2020 track team captain, the College Preparatory School
- Fall 2019 cross country team captain, the College Preparatory School
- Jewish Club leader, 2019-2020, the College Preparatory School
- Peer math tutor throughout high school (2016-2020)

ACADEMIC ACHIEVEMENTS AND AWARDS

- Awarded highest honors for math thesis, Williams College
- 3.99 overall unweighted GPA, 4.0 GPA in the math major, Williams College
- Sigma Xi science honor society inductee, Spring 2024
- Winner of the Benedict Prize for the best sophomore in mathematics, Williams College 2022
- Phi Beta Kappa honor society inductee, Summer 2023
- Scored 900 on the Math GRE Subject Test
- Invited to present on my research in topological combinatorics at the poster session for the Joint Mathematics Meeting in San Francisco, January 2024
- Invited to the Youth Mathematicians' Conference at The Ohio State University, August 20223 and presented a paper entitled "Generalizations of the Erdős–Ginzburg–Ziv theorem via topology."
- Invited to the Youth Mathematicians' Conference at The Ohio State University, August 2022 and presented two papers there, one on general position point configurations in three dimensions to minimize distinct angles and one on Zeckendorf-style decompositions of integers into Fibonacci numbers
- Invited to the Twentieth International Fibonacci Conference, July 2022; presented a live virtual talk entitled "The Far-Difference Game," the recording of which is available here: https://www.youtube.com/watch?v=XR-CK1_E-JU
- Williams College Dean's List, 2020-2023
- Winner of the College Preparatory School Mathematics Departmental Award for most exceptional graduating senior, Spring 2020
- 4.0 unweighted high school GPA; 1580 SAT score; 800 on the Math II SAT subject test
- College Board National Merit Award recipient, 2020
- Four-time American Mathematics Invitational Examination (AIME) qualifier (2017, 2018, 2019, 2020)
- Inducted into the Cum Laude honor society, Spring 2019 (high school junior year)

OTHER SKILLS AND EXTRACURRICULAR INVOLVEMENT

- Organized and led backpacking trips in the Rockies for groups of 12 high schoolers at a time, working for Overland Summers teaching wilderness skills, planning meals and allotting gear, and inspiring a love of the outdoors, June-August 2024
- Hiked the Pacific Crest Trail in Summer 2021, averaging 28 miles a day for 77 days
- Captain of the Williams Varsity Cross Country team, which required organizing meetings and some practices and training daily, running 80-90 miles most weeks
- Played piano from 1st-12th grade, practicing daily for 30-40 minutes
- Regularly led synagogue services throughout high school and served on the board of the Williams College Jewish Association
- Certified in CPR, Wilderness First Aid, and Wilderness Lifeguarding
- Proficient in Spanish
- Proficient in Java and LaTeX, familiar with Mathematica and Python

REFERENCES

Asher Auel, Associate Professor of Mathematics, Dartmouth College, asher.auel@dartmouth.edu
Steven Joel Miller, Professor of Mathematics, Williams College, sjm1@williams.edu
Thomas Garrity, Professor of Mathematics, Williams College, tgarrity@williams.edu
Florian Frick, Professor of Mathematics, Carnegie Mellon University, frick@cmu.edu
Susan Loepp, Professor of Mathematics, Williams College, sloepp@williams.edu
Leo Goldmakher, Associate Professor of Mathematics, Williams College, lg5@williams.edu