Darrion Thornburgh

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Education

Ph.D. in Mathematics – Vanderbilt University, College of Arts and Science — August 2024 — May 2029 (expected)
Incoming first-year graduate student — Nashville, TN

B.A. in Mathematics and Computer Science – Bard College — August 2020 — May 2024
Thesis: *Symmetry and Structures of APN functions and Sidon sets*. — Annandale-on-Hudson, NY

Research and Internship Experience

Geometric Group Theory REU Researcher — CUBE at Vanderbilt University — June 2024 — Present

- Studying the genus of a right-angled Artin groups, and studying the curve complex of surfaces. **Advisors:** Ryan Dickmann, Dan Margalit, and Abdoul Karim Sane.

Data Science Internship — DSC-WAV — August 2023 — April 2024

- Created an R package which takes existing code from past DSC-WAV interns to be used by other programmers. This project was funded by the NSF. **Advisor:** Dr. Valerie Barr.

Topology REU Researcher — CUBE at Georgia Tech — May 2023 — July 2023

- Constructed explicit examples in the curve complex of the 5-punctured sphere, proving it is not 1-hyperbolic.
- Introduced the notion of the intersection graphs of curves and arcs on a surface to provide lower bounds on intersection numbers. This project was funded by the NSF. **Advisors:** Dr. Wade Bloomquist and Dr. Dan Margalit.

Affine Geometry Undergraduate Researcher — Bard Summer Research Institute (BSRI) — June 2022 — July 2022

- Classified all Sidon sets, or 2-caps, in the affine geometry $\mathbb{F}_2^n$ up to size 9, with respect to affine isomorphism, and wrote computer calculations to provide an upper bound on the count of affine equivalence classes up to dimension 11.
- Defined the daisy property and used it to prove exactly when a Sidon set has an exclude point of a given multiplicity. **Advisor:** Dr. Lauren Rose.

Publications

[4] **Exclude points of Sidon sets in $\mathbb{F}_2^n$.** Felicia Flores, Timothy E. Goldberg, Lauren L. Rose, and Darrion Thornburgh. *In preparation.*

[3] **Uniform exclude distributions of Sidon sets.** Darrion Thornburgh. *Preprint.* arXiv:2407.11783. July 2024.

[2] **Topological methods in zero-sum Ramsey theory.** Florian Frick, Jacob Lehmann Duke, Meenakshi McNamara, Hannah Park-Kaufmann, Steven Raanes, Steven Simon, Darrion Thornburgh, and Zoe Wellner. *Submitted to Forum of Mathematics, Sigma.* arXiv:2310.17065. November 2023.

[1] **How Many Cards Should You Lay Out in a Game of EvenQuads? A Detailed Study of 2-Caps in $\mathrm{AG}(n, 2)$.** Julia Crager, Felicia Flores, Timothy E. Goldberg, Lauren L. Rose, Daniel Rose-Levine, Darrion Thornburgh, and Raphael Walker. *La Matematica*. May 2023.

Honors and Awards

M. Susan Richman Senior Project Prize in Mathematics, Bard College, May 2024. *"A prize named in honor of Dr. Richman, mathematician, university educator, and administrator, and mother of two mathematicians, given annually to recognize the senior student exhibiting the most mathematical creativity, as determined by the Bard mathematics faculty."*

William J. Lockwood Prize, Bard College, May 2024. *"Awarded to the senior student, who, in the judgement of the president, has contributed most to the general welfare of the College."*

Kenneth Bush '36 Memorial Scholar in Mathematics, Bard College, 2023-2024.

Distinguished Scientist Scholarship (DSS) Award, Bard College, 2023-2024.

Darnell Pierce Award, Bard College, May 2023. *"Awarded to a Peer Counselor [Residential Advisor] in their sophomore or junior year who demonstrates excellent leadership qualities, and has excelled in their role as a Peer Counselor. The recipient demonstrates a standard of excellence in their chosen program of study, and significantly contributes to student life at the College."*

Head Junior Marshal, Bard College, May 2023.

1st Place in Simon's Rock Hackathon *Visualizing Music with Generative AI*, 2021. In collaboration with Henry Chang, Josef Lazar, and Raphael Walker.

Teaching Experience & Engagement

Member, Association for Women in Mathematics Club & Chapter — Bard College — August 2022 — May 2024

Mathematics Tutor — Bard College Learning Commons — August 2021 — May 2024

- Served as a dedicated course tutor for Scientific Computing, Real Analysis, Vector Calculus, Linear Algebra, and Proofs & Fundamentals.
- Held one-on-one appointments and office hours for students enrolled in any course in mathematics.

Computer Science Tutor — Bard College Learning Commons August 2021 — December 2023

- Served as a dedicated course tutor for Object Oriented Programming.
- Held office hours for students enrolled in any course in computer science.

Presentations

Hudson River Undergraduate Mathematics Conference. Talk by Darrion Thornburgh. *Uniform exclude distributions and APN functions*. Keene, NH. April 2024.

Bard Summer Research Institute Poster Session. Poster by Sami Aurin and Darrion Thornburgh. *The curve graph of the 5-punctured sphere*. Annandale-on-Hudson, NY. October 2023.

Symposium for Undergraduate Mathematics Research Conference. Talk by Darrion Thornburgh. *On the hyperbolicity of the arc and curve graphs of surfaces*. New Paltz, NY. September 2023.

WIMIN Math Conference. Talk by Darrion Thornburgh. *On the hyperbolicity of the arc and curve graphs of surfaces*. Northampton, MA. September 2023.

Bard College Mathematics and Computer Science Seminar. Talk by Darrion Thornburgh. *On the hyperbolicity of the arc and curve graphs of surfaces*. Annandale-on-Hudson, NY. September 2023.

MAA MathFest. Poster by Sami Aurin and Darrion Thornburgh. *The curve graph of the 5-punctured sphere*. Tampa, FL. August 2023.

Georgia Tech Summer Research Poster Session. Poster by Sami Aurin and Darrion Thornburgh. *The curve graph of the 5-punctured sphere*. Atlanta, GA. July 2023.

Hudson River Undergraduate Mathematics Conference. Talk by Felicia Flores and Darrion Thornburgh. *2-Caps in the game of EvenQuads: The Daisy Property*. South Hadley, MA. April 2023.

Joint Mathematics Meetings. Talk by Felicia Flores and Darrion Thornburgh. *2-Caps in the game of EvenQuads: The Daisy Property*. Boston, MA. January 2023.

Bard Summer Research Institute Poster Session. Poster by Felicia Flores and Darrion Thornburgh. *2-Caps in the game of EvenQuads*. Annandale-on-Hudson, NY. September 2022.

Bard College Mathematics Seminar. Talk by Felicia Flores and Darrion Thornburgh. *2-Caps in the game of EvenQuads: The Daisy Property*. Annandale-on-Hudson, NY. September 2022.

Specialized Skills

Programming: Proficient in C, C++, Java, Python, JavaScript, MATLAB, R, Racket, Scheme, Bash, and SQL.
Languages: English (Native), Spanish (Intermediate-Novice), Korean (Novice)

Last updated: July 17, 2024