Darian Colgrove

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SUMMARY

Graduate student and full-time tutoring center manager with a passion for pure mathematics and a deep interest in the power of abstraction to reveal structure and meaning in complex ideas.

EDUCATION

2026	M.S.	(Mathematics)	University of North Dakota
2021	B.S.	(Mathematics)	Grand Forks, ND

GRADUATE COURSEWORK

Algebra I/II	Modern Analysis I/II
Topology I	Introduction to Analysis I/II
Theory of Numbers	Linear Algebra

AREAS OF INTEREST

General: Algebra, Graph Theory, Combinatorics, Artificial Intelligence, Category Theory, Mathematical Logic

Specific: Commutative Algebra, Galois Theory, Algebraic Geometry, Algebraic Graph Theory, Random Graph Theory, Machine Learning, Artificial Neural Networks, Model Theory

PUBLICATIONS

Winning the Lottery Every Time: Reliable Extraction of Strong Lottery Tickets in Neural Networks B. A. Christopherson, D. Colgrove, J. Baretz, D. Kwakye, M. Epstein, S. Dandan (In-progress).

A Conditional Extension of the Park-Pham Theorem B. A. Christopherson, D. Colgrove, 11 pp. (To be submitted; ArXiv preprint: `https://arxiv.org/abs/2402.17872v2`).

RESEARCH EXPERIENCE

Graduate Research Assistant   Aug. 2023 - present
University of North Dakota
Department of Mathematics & Statistics

- Assisting Dr. Bryce Christopherson in studying thresholds of random graphs, specifically working to generalize the Park-Pham Theorem (formerly the Kahn-Kalai Conjecture) to general posets and potentially non-uniform probability measures.

- Successfully applying results of our work to develop a procedure for finding sub-networks of randomly-weighted, untrained artificial neural networks which perform the task of a larger, trained network to within an arbitrary degree of precision without training (ala Frankle and Carbin's "Lottery Ticket Hypothesis").

- Working to extend our results to create a "library" of sub-networks which can be called upon, either individually or in various combinations, via a "router" to perform a wide-range of classification tasks without the need for task-specific training.

- Exploring possible applications of our work on the Park-Pham Theorem to other open problems in pure mathematics, such as the Union-Closed Set Conjecture.

Teaching Experience					
	2026	Spring	Intermediate Algebra	(Support/Tutor)	U. North Dakota
		Spring	College Algebra	(Support/Tutor)	U. North Dakota
		Spring	Precalculus	(Support/Tutor)	U. North Dakota
		Spring	Mathematics in Society	(Support/Tutor)	U. North Dakota
	2025	Fall/Spring	Intermediate Algebra	(Support/Tutor)	U. North Dakota
		Fall/Spring	College Algebra	(Support/Tutor)	U. North Dakota
		Fall/Spring	Precalculus	(Support/Tutor)	U. North Dakota
		Fall/Spring	Mathematics in Society	(Support/Tutor)	U. North Dakota
	2024	Fall/Spring	Intermediate Algebra	(Support/Tutor)	U. North Dakota
		Fall/Spring	College Algebra	(Support/Tutor)	U. North Dakota
		Fall/Spring	Precalculus	(Support/Tutor)	U. North Dakota
		Fall/Spring	Mathematics in Society	(Support/Tutor)	U. North Dakota
	2023	Fall/Spring	Intermediate Algebra	(Support/Tutor)	U. North Dakota
		Fall/Spring	College Algebra	(Support/Tutor)	U. North Dakota
		Fall/Spring	Precalculus	(Support/Tutor)	U. North Dakota
		Fall	Mathematics in Society	(Support/Tutor)	U. North Dakota
	2022	Fall	Intermediate Algebra	(Support/Tutor)	U. North Dakota
		Fall	College Algebra	(Support/Tutor)	U. North Dakota
		Fall	Precalculus	(Support/Tutor)	U. North Dakota
	2020	Fall/Spring	Intermediate Algebra	(Tutor)	U. North Dakota
		Fall/Spring	College Algebra	(Tutor)	U. North Dakota
		Fall/Spring	Precalculus	(Tutor)	U. North Dakota
		Fall/Spring	Applied Calculus	(Tutor)	U. North Dakota
		Fall/Spring	Calculus I	(Tutor)	U. North Dakota
		Fall/Spring	Calculus II	(Tutor)	U. North Dakota
	2019	Fall/Spring	Intermediate Algebra	(Tutor)	U. North Dakota
		Fall/Spring	College Algebra	(Tutor)	U. North Dakota
		Fall/Spring	Precalculus	(Tutor)	U. North Dakota
		Fall/Spring	Applied Calculus	(Tutor)	U. North Dakota
		Fall/Spring	Calculus I	(Tutor)	U. North Dakota
		Fall/Spring	Calculus II	(Tutor)	U. North Dakota
	2018	Fall/Spring	Intermediate Algebra	(Tutor)	U. North Dakota
		Fall/Spring	College Algebra	(Tutor)	U. North Dakota
		Fall/Spring	Precalculus	(Tutor)	U. North Dakota
		Fall/Spring	Applied Calculus	(Tutor)	U. North Dakota
		Fall/Spring	Calculus I	(Tutor)	U. North Dakota
		Fall/Spring	Calculus II	(Tutor)	U. North Dakota
	2017	Fall	Intermediate Algebra	(Tutor)	U. North Dakota
		Fall	College Algebra	(Tutor)	U. North Dakota
		Fall	Precalculus	(Tutor)	U. North Dakota
		Fall	Applied Calculus	(Tutor)	U. North Dakota
		Fall	Calculus I	(Tutor)	U. North Dakota
		Fall	Calculus II	(Tutor)	U. North Dakota

MALL Manager & Academic Specialist   Aug. 2022 - present
University of North Dakota
Department of Mathematics & Statistics

- Oversee the day-to-day operations of UND's state-of-the-art Math Active Learning Lab (MALL) including: supervising tutors and other student employees, creating weekly schedules and approving employee time sheets, and hiring and training new tutors.

- Monitor tutor performance and provide constructive feedback and additional training, including planning and leading monthly professional development seminars.

- Analyze performance of over 1,500 students each year and identify students at risk of failing using factors such as assignment completion, class attendance, and midterm exam scores.

- Perform academic interventions for at-risk students, meeting with them to understand their barriers to success and develop improvement plans tailored to each student's specific needs.

Cybersecurity Risk Analyst   Nov. 2021 - May 2022
State of North Dakota
Information Technology Department

- Assessed vulnerabilities in state IT systems and infrastructure using both qualitative and quantitative methods and recommended implementation of appropriate control measures based on state and federal policies and guidelines.

- Developed cybersecurity training programs and awareness campaigns which impacted employees state-wide.

- Collaborated with others to create deliverables for policymakers and stakeholders to inform their decision-making.

Cybersecurity GRC Intern   Feb. 2021 - Nov. 2021
State of North Dakota
Information Technology Department

- Analyzed both public and sensitive data using a variety of tools and methods to inform Department decision-making.

Peer Math Tutor   Aug. 2017 - Dec. 2020
University of North Dakota
Department of Mathematics & Statistics

- Maintained working knowledge and deep understanding of topics from a variety of classes ranging from Intermediate Algebra to Calculus II and beyond with an ability to dynamically shift focus between the full range of courses as student questions arose.

- Utilized Socratic-style questioning, augmented with other modern tutorial best-practices, to guide students toward solutions to specific problems and foster deeper, comprehensive understanding of the material as a whole.

- Established and maintained working relationships with students to build trust and enhance the quality of their tutorial experience and outcomes.

- Regularly participated in training and professional development sessions to receive and respond to feedback from supervisors and peers and hone skills.

SERVICE ACTIVITY	*Grader*, UND Math Track Meet Competition	Jan. 12th 2026
	Volunteer Tutor, Private Math Tutoring	Oct. 2025 - present
	Presenter, Grand Forks BrainSTEM	Oct. 2nd 2025
	Judge, North Dakota State Science & Engineering Fair	Apr. 1st 2025
	Grader, UND Math Track Meet Competition	Jan. 13th 2025
	Presenter, Grand Forks BrainSTEM	Oct. 10th 2024
	Server, UND Math Department "Pi Day" Celebration	Mar. 14th 2024
	Runner, UND Math Track Meet Competition	Dec. 22nd 2022
	Greeter, MAA NCS Fall 2022 Meeting	Oct. 14th 2022

MEMBERSHIPS	*President*, UND Math Club	Aug. 2023 - present
	Member, Mathematical Association of America North Central Section (MAA NCS)	Jan. 2025 - present
	President, Society of Physics Students - UND Chapter	Aug. 2017 - May 2019
	Member, Society of Physics Students - UND Chapter	Aug. 2016 - Aug. 2017

CONFERENCES	*2025 Midwest Optimization Meeting* University of North Dakota, Grand Forks, ND	Oct. 31st - Nov. 1st, 2025
	MAA NCS Spring 2025 Meeting St. Olaf College, Northfield, MN	Mar. 21st - 22nd, 2025
	AUVSI Xponential 2024 San Diego, CA	Apr. 22nd - 25th, 2024
	MAA NCS Fall 2022 Meeting University of North Dakota, Grand Forks, ND	Oct. 14th - 15th, 2022

AWARDS & HONORS	Lillian Elsinga Outstanding Student Leader Award	Apr. 25th 2025
	UND Presidential Scholarship	Aug. 2016 - May 2020
	North Dakota Academic Scholarship	Aug. 2016 - May 2020
	North Dakota Career & Technical Education Scholarship	Aug. 2016 - May 2020