Zachary Walsh

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EDUCATION

Candidate for Ph.D. in Combinatorics and Optimization (expected July 2020)
- Dissertation title: "Quadratically Dense Matroids"
- Supervisor: Peter Nelson

Master of Mathematics in Combinatorics and Optimization (2016)
- Dissertation title: "On the Density of Binary Matroids Without a Given Minor"
- Supervisor: Peter Nelson

BA in Mathematics, *summa cum laude* (2015)
- Carleton College, Northfield, Minnesota

RESEARCH INTERESTS

I am currently working on characterizing the extremal functions of quadratically dense minor-closed classes of matroids. This leads me to consider problems regarding connectivity, tangles, and biased graphs.

PUBLICATIONS

- P. Nelson, Z. Walsh. The extremal function for geometry minors of matroids over prime fields. arXiv:1703.03755.
- A. Khodkar, A.L. Peterson, C.J. Wahl and Z. Walsh. Uniquely bipancyclic graphs on more than 30 vertices. *Journal of Combinatorial Mathematics and Combinatorial Computing* 98: 327-342, 2016.

PRESENTATIONS

- *Quadratically Dense Matroids.* CanaDAM 2019, Vancouver, British Columbia.
- *Density of PG(t+1,p)-Minor-Free Matroids.* SiGMA 2017, Waterloo, Ontario.
- *Density of PG(t+2,2)-Minor-Free Matroids.* 2016 International Workshop on Structure in Graphs and Matroids, Eindhoven, Netherlands.
- *Uniquely Bipancyclic Graphs on More Than 30 Vertices.* 28^{th} Midwest Conference on Combinatorics and Combinatorial Computing, Las Vegas, NV, 2014.

TEACHING EXPERIENCE

University of Waterloo (2015-2020)
- Instructor for Deterministic Operations Research Models, Winter 2020.
- Teaching assistant for Graph Theory, Matroid Theory, Introduction to Combinatorics (three times), Introduction to Optimization (twice), Coding Theory, Discrete Mathematics for Engineers (twice), Calculus 2 for Honours Mathematics, Calculus 1 for the Sciences, and Introductory Algebra for the Arts and Social Sciences.

Carleton College (2012-2015)

- Worked at a walk-in tutoring center for undergraduate students of all levels.
- Teaching assistant for Linear Algebra, Multivariable Calculus, and Set Theory.

DEPARTMENT INVOLVEMENT

Co-organizer of the C&O and Pure Math Joint Colloquium series (2018-2020)

- Series of talks by graduate students on topics of interest to both departments.