

TYLER BEAUREGARD

Columbus, OH

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RESEARCH INTERESTS

My main interest is model theory (and finite model theory) especially as it applies to theoretical computer science.

EDUCATION

Ohio State University, Columbus, Ohio

August 2023 – May 2028 (expected)

PhD Student in Mathematics

Truman State University, Kirksville, Missouri

August 2018 – May 2022

Bachelors of Science in Mathematics and Computer Science

PUBLICATIONS AND PREPRINTS

Peer-Reviewed Publications

Beauregard, T., Xia, J., Rosulek, M., *Finding One Common Item, Privately* 2022
In: Galdi, C., Jarecki, S. (eds) Security and Cryptography for Networks. SCN 2022. Lecture Notes in Computer Science, vol 13409. Springer, Cham.

Pre-prints

Devlin, Pat & Meger, Erin & Raz, Abigail & Polymath REU Participants (including Tyler Beauregard) *The Explorer-Director Game on Graphs.* 2021
Url: <https://arxiv.org/abs/2104.09451>

RESEARCH EXPERIENCE

REU in Mathematics and Theoretical Computer Science

Summer 2021

Oregon State University

Advisor: Dr. Mike Rosulek

Developed new protocols for variations of the private set intersection problem in cryptography, with applications in contact sharing, password management, calculating ad efficacy, and more. Implemented simulation-based proofs of the security of our protocol. Resulted in publication in peer-reviewed journal.

Explorer-Director Game

Summer 2020

Polymath REU – Explorer-Director Group

Advisors: Dr. Pat Devlin, Dr. Abigail Raz, and Dr. Erin Meger

Collaborated virtually with a team of researchers to compile a wide array of results about the explorer-director game on graphs. Presented on findings at the Young Mathematicians Conference.

Restrictions on Mondrian Puzzle Solutions

2018 – 2020

Truman State University

Independently prepared a paper over the Mondrian square dissection problem and restrictions on zero-defect solutions. Compared with multiple generalizations, like the Blanche dissection.

Case-by-Case Analysis of the Spectrum Problem for Various Logics

Summer 2020

Truman State University – Ronald E. McNair Program

Advisor: Dr. Todd Palumbo

Proposed study reviewing work on the spectrum problem in finite model theory and exploring new methods to answer the spectrum problem for variations of first-order logic.

CONFERENCE TALKS

Finding One Common Item, Privately

September 2022

Security and Cryptography for Networks: 13th International Conference

Presented on research on the private set intersection (PSI) problem in cryptography. Proposed new secure 2-party protocols (which we called FOCI) for multiple variants of PSI. Accompanied by publication in conference proceedings.

Case-by-Case Analysis of the Spectrum Problem: A Proposed Study

September 2020

MKN McNair Heartland Research Conference

Proposed a study looking at alternative ways to address the spectrum problem through the lens of a case-by-case analysis of specific families of sets. Reviewed preliminary research completed towards this goal and outline an arithmetic construction of first-order spectra.

Optimal Strategies for the Explorer-Director Game

August 2020

Young Mathematicians Conference

Presented with a co-researcher from the Polymath REU on strategies for playing the explorer-director game on graphs. Discussed algorithms important for computationally solving the game both in general and in special cases.

Restrictions on Mondrian Puzzle Solutions

October 2019

Truman State University Math Colloquium

Presented independent research into the Mondrian art problem the existence of a zero-defect solution. Explored techniques, both geometric and number-theoretic, to place restrictions on these solutions, if they exist. Related this problem to a broader problem of Blanche dissections and its connection to graph theory.

A Review of Irrationality Proofs

October 2018

Truman State University Math Colloquium

Presented on the general structure of prototypical irrationality proofs. Demonstrated with classes of numbers, such as roots of polynomial equations. Outlined the work of Apéry and Beukers proving the irrationality of $\zeta(3)$.

TECHNICAL STRENGTHS

Programming Languages

Python 2/3, C, C++, MATLAB/Octave, Java, JavaScript, CoffeeScript, HTML5 (including canvas animation), L^AT_EX

HONORS AND AWARDS

Outstanding Student in Mathematics – Truman State University 2022

First Place Team – Missouri Collegiate Mathematics Competition 2021

Second Place Team – Missouri Collegiate Mathematics Competition 2022

McNair Scholar – Truman State University 2019 – Present

President's List – Truman State University 2018 – 2020

General John J. Pershing Scholarship – Truman State University 2018

WORK EXPERIENCE

A.T. Still University, Kirksville, MO

August 2022 - Present

Biomedical Research Intern

Creating programs to quickly and automatically process a high volume of 3d medical data. Utilizing linear algebra and computer graphic concepts to eliminate existing bottlenecks in data pipeline.

Truman State University, Kirksville, MO

August 2019 – May 2022

Calculus Tutor

Used communication skills in explaining mathematical concepts more effectively. Tutored students in a variety of calculus-related topics as well as applications for both science and business.

Truman State University McNair Program, Kirksville, MO

June 2020 – August 2022

GRE Quantitative Exam Tutor

Designed and implemented personalized study plans for students of various levels of math background. Assisted students in their ability to navigate difficult material strategically, accurately, and efficiently.

South Shelby High School, Shelbina, MO

August 2016 – May 2018

Technology Office Intern

Assisted in maintaining, updating, and repairing school networks and servers. Used troubleshooting techniques to repair school laptops, desktops, and other devices.

ACTIVITIES AND LEADERSHIP

LGBTQ+ in Math Alliance (OSU Spectra Chapter)

- Secretary 2024 – Present

Mathematical Association of America (Truman State University Chapter)

- President 2021 – 2022
- Vice President 2020 – 2021
- Secretary 2019 – 2020

American Mathematical Association

- National Member 2020 – Present

Kappa Mu Epsilon – mathematics honor fraternity (Truman State University Chapter)

- Secretary 2020 – 2021

First Gen United – organization for first generation college students

- President 2019 – 2020
- Historian 2020