VILAS WINSTEIN

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EDUCATION

The Ohio State University *Expected May 2020*
B.S. in Mathematics and Computer Science (double major)
Overall GPA: 4.0

Upper Arlington High School *May 2016*

RESEARCH EXPERIENCE

Biquandle Knot Invariants June 2018 - Present
Knots and Graphs Research Program advised by Prof. Sergei Chmutov *The Ohio State University*

· Investigating the structure of an oriented knot invariant, the Biquandle Bracket, including finding relationships between the Biquandle Bracket and the Biquandle 2-Cocycle invariant.
· Working on generalizing Khovanov's categorification of the Jones polynomial to Biquandle Brackets, and investigating related knot invariants that appear in the construction.
· Winner of the first prize in the poster competition at the 2018 Shenandoah Undergraduate Mathematics and Statistics Conference at James Madison University.
· Conference and Forum Presentations:
  - Young Mathematicians Conference (twice) August 2018 & August 2019
    The Ohio State University
  - Shenandoah Undergraduate Mathematics and Statistics Conference October 2018
    James Madison University
  - Denman Undergraduate Research Forum February 2019
    The Ohio State University
  - Joint Mathematical Meetings Undergraduate Poster Session January 2020 (accepted)
    MAA & AMS, Denver, Colorado
· Papers:
  - The Structure of Biquandle Brackets (arXiv:1907.11487) Submitted to JKTR
    Will Hoffer, Adu Vengal, Vilas Winstein
  - Upcoming Paper on a Categorification of Biquandle Brackets In Preparation
    Adu Vengal, Vilas Winstein

Weierstrass Points on Tropical Curves June 2017 - April 2018
Knots and Graphs Research Program advised by Prof. Sergei Chmutov *The Ohio State University*

· Investigating the topological properties of the set of Weierstrass points on a tropical curve.
· Conference and Forum Presentations:
  - Young Mathematicians Conference August 2017
    The Ohio State University
  - Denman Undergraduate Research Forum April 2018
    The Ohio State University

Computational Analysis and the Riemann Zeta Function October 2016 - September 2017
Independent Project advised by Prof. Ghaith Hiary *The Ohio State University*

· Implementing a new formulation for the Riemann Zeta function which is theoretically faster than current computational methods for large input values, and optimizing it for high performance.
· Funded by an OSU Undergraduate Research Scholarship.
· Presented at the Fall Undergraduate Research Forum at OSU in September 2017.

ACADEMIC AWARDS

Barry Goldwater Scholar — April 2019
Mathematics — *The Ohio State University*

First Place in Research Poster Presentation Competition — October 2018
Shenandoah Undergraduate Mathematics and Statistics Conference — *James Madison University*

Third Place in the Gordon Mathematics Competition — March 2019
Rasor-Bareis-Gordon Mathematics Competition — *The Ohio State University*

Third Place in the Rasor Mathematics Competition — March 2017
Rasor-Bareis-Gordon Mathematics Competition — *The Ohio State University*

Phi Beta Kappa Member — April 2019
Epsilon of Ohio Chapter — *The Ohio State University*

TALKS AND PRESENTATIONS

Talks given at the "Reading Classics" math seminar at OSU:

- "Quadrature of the Hyperbola" — Autumn 2016
- "Origami Geometry and Lill's Method" — Spring 2017
- "André's Alternating Permutations" — Autumn 2017
- "Euler and 'le Jeu de Rencontre' " — Spring 2018
- "Lambert's Proof that π is Irrational" — Autumn 2018
- "Hilbert's Third Problem" — Autumn 2019

Talks given at the "What Is ...?" math seminar at OSU:

- "What is the Lambda Calculus?" — Summer 2017
- "What is the Recursion Theorem?" — Summer 2018
- "What is Shor's Algorithm?" — Summer 2019

Various other talks for seminars and classes:

- Lecture on biquandle knot invariants for the OSU Quantum Algebra/Quantum Topology Seminar
- Two-lecture presentation on representation theory, the RSK correspondence, and Young's rule
- Lecture on paradoxical groups and the Banach-Tarski paradox
- Lecture on pigeon-hole and double-counting including Sperner's lemma and applications

JOBS, ACTIVITIES, AND SKILLS

Jobs

- Student Instructional Assistant for MATH 1130 at OSU — August 2019 - Present
- Mentor and Grader for MATH 4181H and 4182H at OSU — January 2018 - April 2019
- Calculus tutor at the Math & Stats Learning Center at OSU — October 2016 - December 2017
- Grader for CSE 2221 and 2321 at OSU — January 2016 - August 2016

Activities

- Lead Organizer for the Radical Pi Math Club at OSU — August 2018 - Present
- President and Treasurer of Bike Club at OSU — Spring 2018 - Present
- Putnam Exam Competitor (Best score: 21 points, rank 621.5 out of 4638) — 2016, 2017, and 2018
- Winner of OSU's ACM ICPC Regionals Qualifying Round — Autumn 2019

Skills

- Proficient in LaTeX and Mathematica, and in programming languages like Python, C♯, and Haskell.