SAMUEL LIDZ

University of Maryland Undergraduate Student Fourth Year

slidz@umd.edu https://www.math.umd.edu/~slidz/

ACADEMIC INTERESTS

I am primarily interested in algebraic geometry, particularly moduli spaces.

EDUCATION

B.S. in Mathematics, University of Maryland, Departmental Honors, expected spring 2025.GPA: 3.903Math GPA: 4.0

Research

- In summer 2024, I attended the PCMI undergraduate summer school. The theme was motivic homotopy theory. While there, I worked with Adam Melrod and Zachary Lihn to produce results in equivariant enumerative geometry, following the result of Thomas Brazelton called equivariant conservation of number. We classify the S_3 -set structure of a transverse intersection of symmetric curves in \mathbb{P}^2 , and use this to restrict the number of real points in an intersection of real transverse symmetric curves. We get similar but slightly weaker results in \mathbb{P}^3 . A computation arising from a more general theory of equivariant characteristic classes should agree with ours, so our result is a benchmark against which to measure such a theory as it is developed. (Paper on the arxiv)
- Over summer 2023, with Professor Amin Gholampour's guidance, I read about the Weil conjectures and the Hilbert scheme, focusing on the Hilbert scheme of points on a surface. Göttsche found a generating function for the Betti numbers of the Hilbert scheme of a smooth surface, so I was reading his book "Hilbert schemes of zero-dimensional subschemes of smooth varieties," in the hopes of finding a way to generalize his result to the case of a two-dimensional DM stack.
- In the 2023-2024 academic year, I attended UMD's RIT on Hodge Theory, run by Professor Patrick Brosnan.
- In high school I worked under the guidance of Professor Lawrence Washington on a project in number theory. I tried to further understand the relationship between Shapiro numbers (defined via iterative application of the Euler ϕ function) and the primes. I found that the Shapiro numbers satisfy Legendre's conjecture, and improved the bounds on the growth of the Shapiro numbers given in another paper.

Advanced Coursework

Courses whose first digit is 6 or higher are graduate level courses, while 4 or lower are undergraduate courses.

Current Courses

MATH 636	Representation Theory of p-adic Groups	Fall 2024
MATH 808E	Complex Abelian Varieties	Fall 2024
AMSC 466	Numerical Methods of Scientific Computing	Fall 2024

¹Updated December 1, 2024

Past Courses

Commutative Algebra	Spring 2024
Algebraic Topology II	Spring 2024
Special Values of L-Functions	Spring 2024
Topics on the Moduli Space of Curves	Spring 2024
Algebraic Geometry	Fall 2023
Algebraic Topology I	Fall 2023
Real Analysis	Fall 2023
Complex Analysis I	Spring 2023
Abstract Algebra II	Spring 2023
Abstract Algebra I	Fall 2022
Reading course w Prof. A. Gholampour using Fulton's Algebraic Curves	Fall 2022
	Commutative Algebra Algebraic Topology II Special Values of L-Functions Topics on the Moduli Space of Curves Algebraic Geometry Algebraic Topology I Real Analysis Complex Analysis I Abstract Algebra II Abstract Algebra I Reading course w Prof. A. Gholampour using Fulton's Algebraic Curves

TEACHING

- Teaching Assistant, MATH 141: Calculus II. (Spring 2024, 25 students)
- Teaching Assistant, MATH 140: Calculus I. (Fall 2023, 25 students)
- Instructor, MATH 299R: Ripping logic at the seams: the philosophical foundations of math. (Fall 2022; 16 students).

I designed and taught this course with Ezra Aylaian. The course explored the way the philosophy of math interacts with math: we studied platonism, formalism, intuitionism, constructivism, finitism, and structuralism; arguments for and against each; and the mathematical systems arising from them. A news article was written about MATH 299R and another student-run math course.

OUTREACH

• Intersections of real symmetric hypersurfaces. Math club at UMD (September 23 2024).

I spoke with Adam Melrod about our work with Zachary Lihn in summer 2024 to an audience of undergraduate students. We explained various elements of algebraic geometry and intersection theory in order to make our results accessible, and then presented some of our results.

- What's hat got to do with it? A hat trick of prisoner hat puzzles. Math club at UMD (Apr 3 2023). I spoke about various puzzles dealing with infinity. These are solved using the axiom of choice in a key way.
- Visualizing phenomena in the hyperbolic plane. Guest speaker at Montgomery Blair High School Logic Math Class (Oct 26 2022, Mar 14 2022).

I spoke about various features of hyperbolic geometry, including parallels, hypercycles, horocycles, and holonomy, using various models of the space. I used the game Hyperrogue as a visual aid to demonstrate how these features look, mainly in the Beltrami-Poincaré disk.

AWARDS

- Abramowitz award (2024).
- Strauss teaching assistantship (2023)
- Dan Shanks award (2023)

NON-MATHEMATICAL JOBS

Aug 2021 - Oct 2023 House of Musical Traditions, Takoma Park MD, Sales and Minor Repairs