Holden Mui

+1 (630) 635 0766 • muiholden@gmail.com
www.mit.edu/~hsmui

Work experience

0xPARC: research engineer *Jun. 2025 - present*

I co-developed a zero-dependency high-performance fully homomorphic encryption (FHE) library as part of a four-person core team, complete with a CUDA backend and a polynomial compiler to optimize encrypted computations. I spearheaded the inaugural demo (128×128 Conway's Game of Life in FHE) and authored technical specifications for a cohort of external developers to implement features such as encrypted inference, encrypted linear and logistic regression, and encrypted bit arithmetic. I also designed the technical interview framework, authoring original problems and evaluating candidates. Reference: Albert Ni.

Supervised UROP: researcher *Jun. 2022 - Aug. 2022, Jun. 2024 - Aug. 2024*

A research position offered by the MIT math department designed to give MIT undergraduates an opportunity to work on a research project under the guidance of a graduate student mentor. In 2024, I worked with Oriol Solé Pi on computing the probability $1, 2, \ldots, k$ are in the same cycle in a product of two n-cycles; this work was published in the *Annals of Combinatorics*. In 2022, I worked with Ashwin Sah, Mehtaab Sawhney, and Tomasz Ślusarczyk on characterizing the upper tail of cycle distributions in sparse Erdős-Rényi random graphs. References: Mehtaab Sawhney and Oriol Solé Pi.

Summer Program for Undergraduate Research: researcher *Jun. 2023 - Aug. 2023*

Worked with Serena An and Elisabeth Bullock on algebraic combinatorics research. We explored properties of flip graphs on self-dual order ideals in self-dual posets. Reference: Elisabeth Bullock.

Education

Massachusetts Institute of Technology: class of 2025 *Aug. 2021 - May. 2025*

Mathematics major, music major, and physics minor. GPA: 5.0. Elected to Phi Beta Kappa. Selected graduate coursework: Applied Cryptography (A+), Schur Polynomials and Schubert Polynomials (A+), Combinatorics and Geometry (A+), Ramsey Theory (A), Analysis of Boolean Functions (A+), Graph Theory and Additive Combinatorics (A), Probabilistic Methods in Combinatorics (A), Commutative Algebra (A+), Introduction to Representation Theory (A+), Algebraic Topology I (A).

Selected research

Coalescence Probabilities of Cycle Products *Sep. 2024*

Holden Mui. arXiv:2409.01415. Published in the *Annals of Combinatorics*.

Flip Graphs on Self-Complementary Ideals of Chain Products *Jan. 2024*

Serena An, Holden Mui. arXiv:2401.01457.

Technical Proficiencies

- **Languages**: Rust, Python, LaTeX
- **Mathematics**: algebra, combinatorics, cryptography

Selected Awards

Putnam Mathematical Competition: rank 21st, 14th, 27th *2021, 2022, 2023*

Mathematical Olympiad Program: three-time qualifier *2018, 2019, 2020*

Selected Teaching

MIT Global Teaching Labs: instructor *Jan. 2022, Jan. 2023, Jan. 2024, Jan. 2025*
An opportunity to support and train the Ghanaian, Tunisian, Bhutanese, and Rwandan IMO teams. In addition to preparing lectures for each country's top students, I visited several schools to stimulate mathematical interest. Reference: Ari Jacobovits and Megha Hegde.

Mathematical Olympiad Program: teaching assistant *Jun. 2022, Jun. 2023, Jun. 2024*
A training program for the USA team at the International Math Olympiad. I graded tests, presented solutions during test review, taught a class, led a singing group, and helped organize social events. Reference: Po-Shen Loh.

Other Experience

USA Mathematical Olympiad Editorial Board: problem writer *Apr. 2022 - May. 2025*

Curious Cube: podcast host (68k views) *Dec. 2021 - Aug. 2023*