


Luis Modes

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“Being happy is the greatest form of success.” – unknown

Profile and Skills

Interests: Math, topology, number theory, algebraic geometry, math contests, education, writing

Skills: Problem-solving, math olympiad coaching, mentoring

Languages: English (Advanced), Spanish (Native), Japanese (Intermediate)

Programming: Python, L^AT_EX, SageMath

Education

Massachusetts Institute of Technology

Undergraduate

Cambridge, MA

September 2021 – Present

Academia Interamericana de Panamá sede Cerro Viento

High School Diploma

Panama, Panama

March 2008 – December 2020

Selected Coursework

Topology

- 18.905 Algebraic Topology I: *Homology, cohomology, manifolds, and applications*
- 18.904 Seminar in Topology: *Braid groups*
- 18.901 Introduction to Topology: *Point-set topology, fundamental group, and covering spaces*

Number Theory and Algebra

- 18.783 Elliptic Curves: *Isogenies, pairings, theory of complex multiplication, and cryptography*
- 18.782 Introduction to Arithmetic Geometry: *Results such as the Hasse-Minkowski theorem*
- 18.705 Commutative Algebra: *Exactness, tensor products, localization, and completion*
- 18.702 Algebra II: *Group representations, rings, ideals, fields, and Galois theory*
- 18.701 Algebra I: *Group theory, geometry, and linear algebra*

Analysis and Calculus

- 18.101 Analysis and Manifolds: *Vector fields, densities, and integral calculus on manifolds*
- 18.100B Real Analysis: *Sequences, series, limits, continuity, differentiability, and metric spaces*
- 18.03 Differential Equations: *Study of differential equations, including modeling physical systems*
- 18.02A Calculus II: *Multivariable calculus, vector algebra in 3-space, determinants, and matrices*
- 18.01A Calculus I: *Differentiation and integration of functions of one variable with applications*

Programming

- 6.100B Introduction to Computational Thinking and Data Science
- 6.100A Introduction to Computer Science and Programming in Python

Research Experience and Directed Readings

18.099 Independent Study: The Geometry of Complex Analysis

MIT, 2023

- Read *An Introduction to the Theory of Analytic Functions of One Complex Variable* by Lars Ahlfors
Reference: Joshua Wang

Directed Reading Program

MIT, 2023-2024

- Read and made a presentation about *Using the Borsuk-Ulam Theorem* by Jiří Matoušek
Reference: Elia Portnoy
- Read and made a presentation about *h -cobordisms and Smale's theorem*
Reference: Joye Chen

Work Experience

MIT PRIMES Mentor	MIT, 2023
<ul style="list-style-type: none">• Mentored high school students through the material of <i>The Knot Book</i> by Colin Adams	
Undergraduate Assistant for 18.901 Introduction to Topology	MIT, 2023
Undergraduate Math Association Mentor	MIT, 2022
<ul style="list-style-type: none">• Provided mentorship to students in introductory real analysis and algebra classes	
Grader for 18.101 Analysis and Manifolds	MIT, 2023
Grader for 18.100B Real Analysis	MIT, 2022

Volunteer Roles, Teaching, and Coaching

HMMT Problem Czar	August 2022 – May 2023
<ul style="list-style-type: none">• Wrote and chose problems for the February tournament and helped with the November tournament	
Panamanian Mathematical Olympiad Member	January 2021 – Present
<ul style="list-style-type: none">• Wrote a handout and gave a lecture about Circle Geometry in a seminar for high school teachers• Organized the shortlist of proposed problems for the 2021 and 2022 Panamanian Mathematical Olympiad	
Panamanian Training Program Instructor	October 2020 – Present
<ul style="list-style-type: none">• Served as Panama's Deputy Leader at the 2023 International Mathematical Olympiad• Currently serve as a math olympiad instructor, mainly in Geometry and Algebra• Gave the new students an introductory \LaTeX course• Served as Panama's Deputy Leader at the 2020 Iberoamerican Mathematical Olympiad• Served as a jury member at the 2020 Central American and Caribbean Mathematical Olympiad	
AIPCV Math Olympiad Coach	April 2018 – December 2020
<ul style="list-style-type: none">• Trained the AIPCV school's team for the first and second rounds of the National Olympiad• Wrote a virtual book to train the team	

Selected Honors and Awards

International Mathematical Olympiad (IMO): Bronze Medal	July 2021
International Mathematical Olympiad (IMO): Bronze Medal	September 2020
Panamanian Mathematical Olympiad: Gold Medal	2016 – 2020
Asian Pacific Mathematical Olympiad (APMO): Silver Medal	2019