

Clyde Kertzer

University of Colorado, Boulder

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EDUCATION Bachelor of Mathematics (Honors), *summa cum laude* May 2025
University of Colorado, Boulder
Honors Thesis: *Parameterizations of Descartes Quadruples*
Advisors: Professor Katherine Stange & Professor James Rickards

PUBLICATIONS *Symmetries in Apollonian circle packings (Submitted)*

A Gallery of Theorems

With Cody DiCesare, AJ Jelonnek, Sarah Petersen and Ella Todd

To appear in Math Horizons, September 2025

The Local-Global Conjecture for Apollonian circle packings is false

With Summer Haag, James Rickards, and Katherine E. Stange

Annals of Mathematics (2) 200(2): 749-770 (September 2024)

Aftermath: Building Community with COSMOS

With Oscar Bender-Stone

Math Horizons 32(3), 35 (February 2025)

RESEARCH *The automorphism group of a subshift of finite type* Spring 2025
EXPERIENCE

- Studied the automorphism group of a subshift of finite type
- Advisor: Professor Robin Deeley

Manim Video Creation

Spring 2025

- Developed educational circle packing video with Manim software
- Advisor: Dr. Justin Barhite

Developing Inquiry Based Learning (IBL) Presentations

Fall 2024

- Developed an *interactive* geometry & number theory *talk*
- Advisor: Emily Montelius

Gallery of Theorems

Spring 2024

- Aim: Represent mathematics concepts using artistic mediums
- Further developed Numberscope visualizer, greatly increasing functionality
- Advisor: Professor Sarah Peterson

Honors Thesis - Circle Packings & Descartes Quadruples Fall 2023 - Spring 2024

- Developed honors thesis on Descartes quadruples of Apollonian circle packings
- Advisors: Professor Katherine Stange & Professor James Rickards

CU Boulder REU - Apollonian Circle Packings

Summer 2023

- Disproved the Local-Global Conjecture for Apollonian Circle Packings
- **Paper** led to an article in **Quanta Magazine**
- Advisors: Professor Katherine Stange & Professor James Rickards

Numberscope - Research Assistant and Developer Fall 2022

- Developed the **Numberscope website** to improve user experience
- Programmed visualizer representing Collatz length of user-selected sequences from the OEIS using a scaled color gradient & a modular-controlled array
- A **collage** of my visualizer won the 2023 CU Arts & Sciences art contest
- Advisor: Professor Katherine Stange

READING COURSES

Lie Algebras Fall 2024 - Spring 2025

- *Introduction to Lie Algebras and Representation Theory* (Humphreys)
- Advisor: Professor Richard Green

Algebraic Number Theory & Reciprocity Laws Fall 2024

- *Reciprocity Laws* (Lemmermeyer)
- Advisor: Professor David Grant

Elliptic Curves Spring 2023

- *Rational Points on Elliptic Curves* (Silverman & Tate)
- Advisor: Professor David Grant

Introduction to Number Theory & Quadratic Reciprocity Fall 2021

- *Introduction to the Theory of Numbers* (Niven, Zuckerman, & Montgomery)
- Advisor: Professor Paul Hagelstein

WORK EXPERIENCE

Math Tutor - Private Aug 2019 - Present
algebra 1/2, geometry, precalc, calc 1/2/3, linear algebra, analysis

Math Tutor - Prep Academy Aug 2024 - Present

Mathnasium Tutor Dec 2024 - Jan 2025

Grader - CU Boulder

- Representation Theory - Professor Agnes Beaudry Spring 2025
- Number Theory - Professor Su-ion Ih
- Complex Variables - Professor Jonathan Wise
- Linear Algebra - Professor Richard Green
- Linear Algebra (2 Sections) - Professor Kevin Manley
- Probability Theory - Professor Eric Stade Fall 2024
- Analysis 1 - Professor Alonso Delfin Summer 2024
- Discrete Mathematics - Professor James Rickards Spring 2024
- Analysis 1 - Professor Sean O'Rourke

	<ul style="list-style-type: none"> Linear Algebra - Professor David Grant Discrete Mathematics - Professor Nat Thiern Analysis 1 - Professor James Rickards 	Fall 2023
	<ul style="list-style-type: none"> Discrete Mathematics - Professor David Grant 	Spring 2023
CONFERENCES	<i>2025 Rocky Mountain Section</i> Helped organize the Student Jeopardy Competetion	Apr 11, 2025
	<i>Undergraduate Research Expo</i> , Boulder, CO Presented a poster talk on Symmetries of Apollonian circle packings	Apr 14, 2025
	<i>Math For All</i> , Boulder, CO Presented a poster talk on Symmetries of Apollonian circle packings	Apr 6, 2025
	<i>CTNT</i> , UConn, CT Gave a talk on local-global of Apollonian circle packings	Jun 14-16, 2024
	<i>CU Topology Day</i> , Boulder, CO	Apr 23, 2024
	<i>Undergraduate Research Expo</i> , Boulder CO Presented a poster on local-global of Apollonian circle packings	Apr 20, 2024
	<i>Front Range Number Theory Day</i> , Boulder, CO	Apr 13, 2024
	<i>Joint Mathematical Meetings</i> , San Francisco, CA Presented a poster on local-global of Apollonian circle packings	Jan 3-6, 2024
	<i>Math For All</i> , Boulder, CO Presented a poster on local-global of Apollonian circle packings	Apr 6, 2024
TEACHING & TALKS	<i>Packing Problems & Number Theory - CU Math Club</i> Slides	Mar 5, 2025
	<i>Weekly teaching at Boulder High School through AVID</i>	Fall 2024
	<i>21st Century Mathematics - an online math teachers conference</i> With Summer Haag & Katherine Stange slides	Jun 28, 2024
	<i>CTNT 2024 - The Local-Global Conjecture</i> With Summer Haag slides	Jun 15, 2024
	<i>Honors Thesis Defense</i> Title: <i>Parameterizations of Descartes Quadruples</i>	Apr 10, 2024
	<i>IISER Bhopal - "Problems of Old" (online)</i> talk slides	Oct 10, 2023
	<i>Lecturer - Linear Algebra (MATH 2135) for Professor Green</i> Matrix equations & homogeneous linear systems Vectors & Solutions to linear systems	Sep 8, 2023 Sep 1, 2023

	<i>CU Boulder REU - Apollonian Circle Packings</i> slides	Jun 15, 2023
	<i>Fairview High School - Number Theory Club</i> Modular arithmetic & quadratic residues slides	Mar 9, 2022
LEADERSHIP & OUTREACH	<i>COSMOS Math Club Leadership</i>	Summer 2024 - Present
	<i>Teaching at Mesa Elementary School</i>	
	Graphing on the Coordinate Plane	Feb 14, 2025
	Divisibility tricks	Nov 22, 2024
	Square numbers & Pythagorean triples	Oct 21, 2024
	Prime factorization & basics of cryptography	Aug 27, 2024
	Infinity & infinite sums	Mar 24, 2023
	<i>College Day Student Panel - Speaker</i> Representing the mathematics major	Aug 28, 2024
	<i>Undergraduate Involvement Panel - Speaker</i> Cosmos Math Club	Feb 14, 2024
MEDIA	<i>Two Students Unravel a Widely Believed Math Conjecture</i> Article about <i>The Local-Global Conjecture for Apollonian circle packings is false</i> Quanta Magazine	
	<i>CU students follow their noses, disprove math conjecture</i> Article about <i>The Local-Global Conjecture for Apollonian circle packings is false</i> CU Arts & Sciences Magazine	
COURSEWORK	MATH 6180 - <i>Graduate</i> Algebraic Number Theory	Spring 2025
	MATH 6250 - <i>Graduate</i> Theory of Rings	
	MATH 8174 - <i>Graduate</i> Algebraic Lie Theory	
	MATH 3170 - Combinatorics	Fall 2024
	MATH 6310 - <i>Graduate</i> Real Analysis 1	
	MATH 6210 - <i>Graduate</i> Topology 1	
	EDUC 4050 - Knowing and Learning in Mathematics	
	MATH 4330 - Fourier Analysis	Spring 2024
	MATH 6140 - <i>Graduate</i> Algebra 2	
	MATH 6350 - <i>Graduate</i> Functions of a Complex Variable 1	
	MATH 8114 - <i>Graduate</i> Ergodic Theory & Number Theory	
	MATH 8174 - <i>Graduate</i> Mathematical Cryptography	
	MATH 4440 - Mathematics of Coding and Cryptography	Fall 2023
	MATH 6130 - <i>Graduate</i> Algebra 1	

	MATH 6190 - <i>Graduate</i> Analytic Number Theory		
	MATH 3210 - Euclidean & Non-Euclidean Geometry	Spring 2023	
	MATH 4140 - Abstract Algebra 2 - Representation Theory		
	MATH 4001 - Analysis 2	Fall 2022	
	MATH 6110 - <i>Graduate</i> Intro to Number Theory		
	MATH 3140 - Abstract Algebra 1	Summer 2022	
	MATH 3001 - Analysis 1	Spring 2022 (CU Boulder)	
	MATH 3110 - Intro to Number Theory		
	MATH 3450 - Intro to Complex Variables		
	MTH 2311 - Linear Algebra	Fall 2021 (Baylor University)	
	MTH 3300 - Foundations of Mathematics		
	MTH 3325 - Ordinary Differential Equations		
AWARDS	<i>Robert and Wanda Gunning Endowed Fund</i>	Fall 2024 - Spring 2025	
	\$2,500 per year		
	<i>President Joseph A. Sewall Award</i>	Spring 2022 - Spring 2025	
	\$5,000 per year		
	<i>Invitation to Excellence</i> (Baylor)	Fall 2021	
	\$20,000 per year		
LANGUAGES	LaTeX	Fluent	
	Sage	Intermediate	
	Pari/GP	Intermediate	
	Magma	Beginner	
		Javascript	Intermediate
		Typescript	Intermediate
		HTML	Beginner
EXTRACU- RICULARS	<i>Cosmos Math Club</i>	Spring 2022 - Fall 2024	
	Student Lead		
	<i>Math Club QED</i>	Spring 2022 - Fall 2024	
	<i>Mobius Math Society (Baylor)</i>	Fall 2021	