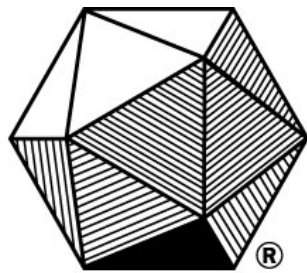


Spring Meeting  
of  
The Southern California-Nevada  
Section of  
The Mathematical Association of  
America

Program and Abstracts



**MAA**

**MATHEMATICAL ASSOCIATION OF AMERICA**

March 28th, 2026

## Acknowledgments

The Southern California-Nevada Section of the MAA welcomes participants to our 2026 Spring Meeting. We would like to thank our invited speakers and our poster session presenters for their participation in the meeting. The Section thanks the Mathematics Department at the University of Southern California for their hospitality in hosting the meeting. We would like to especially thank David Crombroque who handled the local arrangements for the meeting.

Please recycle your name tags at the end of the conference using the boxes provided.

## Section Officers, 2025-2026

MAA Representative: Edray Goins  
Section Chair: Konrad Aguilar  
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Section NExT Liaison: Matthew Gherman  
Las Vegas Liasion: Zhijian Wu  
Web Page Editor: Karrolyne Fogel

Looking for a way to engage with and support our math community? Our officer positions rotate frequently. Current openings the Student Chapters Coordinator who runs our Student Poster Session at the spring meeting (appointed) and the Newsletter editor(appointed). Also, each spring we elect a new Section Vice-Chair and 2nd Program Vice-Chair, who serve on the board for three years. If you are interested in serving in any of the Section Officer positions, but especially one of these that will be open soon, please contact the Past Section Chair (Kim Ayers) or Section Chair (Konrad Aguilar).

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# Schedule

8:30-12:30pm	Registration and Poster Presenter Check-In	Foyer of Taper Hall 101
9:00-9:15	Welcome Remarks	Taper Hall 101
9:15-10:15	Invited Address <b>Thomas Murphy</b> , CSU Fullerton <i>“You can square a cubic segment”</i>	Taper Hall 101
10:15-10:45	Section Business Meeting and State of the Section	Taper Hall 101
10:45-11:00	Refreshment Break  Concurrent Sessions	
11:00-12:00	Student Networking & Games	DMC 152
11:00-12:00	Section NExT Workshop <b>Calum Rickard</b> , University of Southern California <i>“Kinetic Mathematics Activities”</i>	DMC 102
12:00-1:00	Lunch Break	
12:20 - 12:50	Lunch Information Session <b>Konrad Aguilar</b> , Pomona College and <b>Shanna Dobson</b> , CSU Los Angeles  Carol Crawford Award for Excellence in Undergraduate Teaching	Taper Hall 101
1:00-2:00	Invited Address <b>Uduak George</b> , San Diego State University <i>“Quantifying the impact of environmental exposures to toxicants on embryonic development”</i>	Taper Hall 101 Taper Hall 101
2:00-2:10	Conference Photo	
2:10-2:20	Refreshment Break/ Poster Set-Up	
2:25-3:25	Student Poster Session	Taper Hall Foyers
3:30-3:45	Closing Remarks	Taper Hall 101

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## Invited Address and Workshop Abstracts

**Thomas Murphy**, CSU Fullerton  
**You can square a cubic segment**

A central question in Greek mathematics was to determine when it was possible to "square" a shape, meaning to construct a square with the same area using only compass and straightedge. For instance, the famed problem of squaring a circle was not settled until 1882. The only infinite family of shapes which we know how to explicitly square are segments of parabolas, a result of Archimedes. We find the first infinite family of such shapes since then (namely, segments of cubic curves), and place our result in a historical context. The talk will be accessible to anyone who has taken a calculus course. This is joint work with M. Rathbun (CSUF)

**Uduak George**, San Diego State University  
**Quantifying the impact of environmental exposures to toxicants on embryonic development**

Exposure to toxicants can negatively impact embryonic development, long-term organ function, and disease susceptibility, but these effects remain poorly quantified. Traditional laboratory experimentation alone faces limitations in deciphering the impact of toxicant exposures at an organ-specific level, particularly at high throughput. In this talk, I will discuss how integrating laboratory experimentation with computational modeling enables the quantification of the effects of chemical exposures on embryonic development in zebrafish (*Danio rerio*), a widely used vertebrate model for high-throughput toxicity testing.

**Callum Rickard**, University of Southern California  
**Section NExT Workshop: Kinetic Mathematics Activities**

Calum Rickard, a USC teaching fellow and future teaching-track assistant professor at the University of Nevada, will guide us through a number of kinetic mathematics activities about combinatorics and probability. We could learn pigeonhole principle through magical chairs or perform handshake lemma. At the end, we will break into groups to brainstorm similar activities in other branches of math.

**Konrad Aguilar**, Pomona College and **Shanna Dobson**, CSU Los Angeles  
**Lunch Information Session on MAA SoCal-Nevada Section's Carol Crawford Award for Excellence in Undergraduate Teaching**

In this information session, Shanna and Konrad will give a helpful and extensive overview of our MAA SoCal-Nevada Carol Crawford Award for Excellence in Undergraduate Teaching. They will discuss the criteria for eligibility, the guidelines for nomination, and the criteria for evaluation, as well as walk through the nomination process. Shanna and Konrad hope to demystify the process and support our fellow faculty in nominating their eligible colleagues. The session is open to all interested attendees!

## Speaker and Facilitator Biographies

**Thomas Murphy**, CSU Fullerton

Thomas Murphy is a Professor of Mathematics at Cal State Fullerton. He grew up in Ireland on a dairy farm and studied in Ireland and London under Jurgen Berndt.

Since coming to CSUF, he has worked with a wide array of undergraduate projects, many connected with his primary research interests in Riemannian and complex geometry.

**Uduak George**, San Diego State University

Uduak Z. George received her Ph.D. in Mathematics from the University of Sussex in the United Kingdom. She is an Associate Professor of Mathematics at San Diego State University (SDSU) and the Co-Director of the SDSU Artificial Intelligence (AI) Lab for Cancer-Related Health. In her research, she utilizes ordinary differential equations, partial differential equations, graph network modeling, and machine learning to study biological systems. Her current research involves designing novel approaches to integrate mathematical modeling with laboratory experimentation to advance our understanding of biological organ development, with the goal of elucidating how developmental processes impact long-term health. Dr. George has received significant recognition for her research, including the National Science Foundation Faculty Early Career Development (NSF CAREER) Award, the AIM-AHEAD Leadership Fellowship, and the SDSU Presidential Research Fellow Award.

As an educator, she is committed to emphasizing the importance of calculus and linear algebra in undergraduate and graduate-level courses to broaden the understanding of the complex biological systems that shape nature. She enjoys engaging with her community through K-12 outreach activities, where she demonstrates the applications of mathematics in science and engineering. These efforts reflect her passion for illustrating that while math may appear abstract, its true elegance shines when those ideas are used to solve pressing real-world problems. Dr. George received the 2020 Most Influential Faculty Award from the SDSU Department of Mathematics and Statistics, an honor selected by the Outstanding Baccalaureate Candidate. She also received the 2024 Outstanding Faculty Award from the SDSU College of Sciences.

**Calum Rickard**, University of Southern California

Calum Rickard is currently a Dornsife Teaching Fellow in Mathematics at USC. This fall, he will join the University of Nevada, Las Vegas as a teaching-track Assistant Professor of Mathematics. Calum has also taught at UC Davis and last summer he was a faculty member at BEAM LA. He completed his PhD in Applied Mathematics at USC.

**Konrad Aguilar**, Pomona College and **Shanna Dobson**, CSU Los Angeles

Shanna Dobson and Konrad Aguilar are both members of the Teaching Awards Committee for the Southern California-Nevada Section. Konrad Aguilar is the Section Chair and holds a position at Pomona College. Last year he chaired the Awards committee as the Section Vice Chair. Shanna Dobson is SoCal-Nevada Section's current Section Vice Chair and holds a position at Cal State LA. Both have previously served on the section's Program Board.

## Poster Session Abstracts

**Presenter(s):** Joseph Olague, California State University, Channel Islands

**Title:** *Quaternions in Physics*

**Authors(s):** Joseph Olague, California State University, Channel Islands

**Abstract:** We study the use of quaternions and their properties in particle physics. We discuss symmetries of various elementary particles and operations on them. We connect algebraic systems to the fundamental principles that are key to the Standard Model of particle physics.

**Advisor:** Dr. Ivona Grzegorzcyk

**Poster Area(s):** Algebra

**Presenter(s):** Ruilin Zhu, Troy High School

**Title:** *Complex Numbers and Geometry: Several Applications*

**Authors(s):** Ruilin Zhu, Troy High School and Fullerton Math Circle

**Abstract:** In the complex plane, the complex numbers correspond to their affixes, and this allows the use of vectors and their geometric properties. In our present study, we explore the interplay between geometric intuition and algebraic rigor in proofs with complex numbers. I present solutions to three problems from *Gazeta Matematică* (No. 11/2025) that illustrate how geometric reasoning can simplify and illuminate otherwise technical arguments. In many cases, statements about complex numbers carry clear geometric meaning and applications. Together, these three problems emphasize how this geometric viewpoint not only shortens arguments but also deepens conceptual understanding of complex number proofs.

**Advisor:** Dr. Bogdan D. Suceavă and Dr. Shoo Seto

**Poster Area(s):** Algebra, Geometry

**Presenter(s):** Yiwei Cheng, CSUF math circle

**Title:** *Linéaire Dot Vinki*

**Authors(s):** Yiwei Cheng CSUF Math circle

**Abstract:** This presentation will show how to transform a 2D drawing to a psuedo-3D drawing accurately using rotation matrices. It will derive the 3 rotation matrices which will be used to draw out an accurately rotated cube. This process is intended to solve problems in computer graphics, such as finding the vertices of a cube whilst being shown on a 2d screen. It can also be used to predict the position of anything after a 3d rotation.

**Advisor:** Dr. Bogdan Suceavă

**Poster Area(s):** Algebra, Geometry, Linear Algebra

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**Presenter(s):** Farzaneh Namazi, CSUF

**Title:** *Visualizing Mathematical Functions Through Shape Design in Desmos*

**Authors(s):** Farzaneh NamaziFard, Department of Mathematics and CSUF Math Circle, California State University, Fullerton

**Abstract:** This poster explores how mathematical functions can be used to create artistic and geometric designs using Desmos. By combining polynomial, trigonometric, exponential, piecewise, and parametric functions, complex shapes and visually engaging figures can be constructed through careful manipulation of equations and domain restrictions. The project demonstrates how transformations such as translations, reflections, and scalings allow precise control over graphical output. In addition to highlighting the mathematical structure behind each design, the poster emphasizes the educational value of using dynamic graphing technology to deepen conceptual understanding. This approach connects algebraic representations to visual meaning, encouraging creativity while reinforcing function behavior and modeling skills. The goal is to show how mathematics can be both rigorous and expressive, making abstract concepts more accessible and engaging for students.

**Advisor:** Dr. Bogdan Suceavă, Department of Mathematics, California State University, Fullerton

**Poster Area(s):** Algebra, Geometry, Math Education/Pedagogy

**Presenter(s):** Levi Puga, CSU Channel Islands

**Title:** *Field Extensions and Multiplication on their Induced Tori*

**Authors(s):** Levi Puga

**Abstract:** We explore the relationships between quadratic fields and their respective rings of algebraic integers, focusing on two-dimensional rational vector spaces and two dimensional integer lattices. We investigate how these structures interact and examine their underlying algebraic and geometric properties. We delve into the ways in which the properties of quadratic fields influence the structure of two dimensional rational vector spaces and how their rings of algebraic integers influence two dimensional integer lattices. We also introduce a concept we call induced multiplication, which arises from vector space and  $\mathbb{Z}$ -module isomorphisms. These isomorphisms link these distinct mathematical structures together. We leverage these relationships to construct lattices and tori which allows for geometric interpretations of quadratic fields and their integer rings. This provides valuable insight into their topological and algebraic properties, enhancing our understanding of the connection between algebra and geometry. We provide an investigation of the rational circle group, rational lattices and rational tori. Additionally, we study the endomorphisms of rational tori along with matrix representations for algebraic integers.

**Advisor:** Ricardo Suarez

**Poster Area(s):** Algebra, Geometry, Topology

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**Presenter(s):** Adam Noland, California Lutheran University

**Title:** *Formalization and Analysis of the Face-Turning Octahedron Puzzle*

**Authors(s):** Adam Noland

**Abstract:** This paper comprises a brief group-theoretic analysis of the Face-Turning Octahedron (or “FTO”), a niche combination puzzle analogous to Rubik’s Cube. We establish a formal definition of the FTO group by defining a set of basic moves of the puzzle and describing their effects on the pieces of the puzzle by way of a group action. Building upon this definition, we examine several properties of the FTO, including limits on how the puzzle’s pieces may be manipulated, the group’s order, and its structural similarities to the more popular Pyraminx puzzle.

**Advisor:** Karrolyne Fogel

**Poster Area(s):** Algebra, Graph Theory/Combinatorics

**Presenter(s):** Edgar Yak-De Padua, California State University, Los Angeles

**Title:** *Chromatic Number of 6-Valent Circulant Graphs*

**Authors(s):** Edgar Yak-De Padua, Ferdous Ahmed, Yunhee Jang

**Abstract:** The Euclidean plane is flat, rigid, and endless in every direction. Yet, the Euclidean Plane still holds some secrets. The so-called chromatic number of the plane problem asks for the smallest number of colors with which we can assign every point in the Euclidean plane a color such that points of distance one apart from each other receive different colors. This problem remains unsolved. The 6-valent circulant graphs may be central to finding a solution. A formula for the chromatic number of 4-valent circulant graphs is known. However, neither this formula nor its proof generalizes easily to circulant graphs of higher valence. In particular, we have developed a new construction, called “extension ladder homomorphisms,” to determine the chromatic number of these circulant graphs. Our technique has successfully reduced the problem from coloring infinitely many graphs to coloring just a manageably small, finite number of base cases.

**Advisor:** Michael Krebs

**Poster Area(s):** Algebra, Graph Theory/Combinatorics

**Presenter(s):** Jacob Rosales, California State University Channel Islands

**Title:** *Infinitude of Carmichael Numbers in Algebraic Number Rings*

**Authors(s):** Jacob Rosales

**Abstract:** Fermat’s Little Theorem states that for any prime  $p$  and integer  $a$ , the quantity  $a^p - a$  is divisible by  $p$ . Any composite number  $n$  such that for any integer  $a$ ,  $a^n - a$  is divisible by  $n$  is called a Carmichael number. Although these numbers are somewhat rare, their existence makes primality tests based on Fermat’s Little Theorem not as effective as one may hope. Although a few generalizations of Carmichael numbers to PIDs and Dedekind domains have been proposed and considered in recent literature, we more closely study Carmichael ideals and numbers in an algebraic number ring. Not only do we construct examples of Carmichael ideals and numbers in an algebraic number ring, we also demonstrate that there are infinitely many Carmichael ideals as well as non-associate Carmichael numbers in an algebraic number ring.

**Advisor:** Dr. Brian Sittinger

**Poster Area(s):** Algebra, Number Theory

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**Presenter(s):** Eric Lim, University of Southern California

**Title:** *Characterizing the Velocity Turbulence in the Navier Stokes Equations Using the Fourier Transform and Applications*

**Authors(s):** Naveen Prabhath

**Abstract:** The Navier–Stokes equations, which describe an incompressible viscous flow, are studied using the Fourier transform. We work in a turbulent flow regime through our understanding of the Reynolds number and fluid velocity. By taking the Fourier transform, properties of the fluid particle were examined, including periodic flow. Using the conditions given by the flow and the Leray projector, the local time derivative and the directional derivatives are isolated. The results of this analysis are considered with respect to experimental data and empirical data.

**Advisor:** Calum Rickard

**Poster Area(s):** Analysis, Applied Mathematics

**Presenter(s):** Thomas Crawford, CSUCI

**Title:** *Exploring Euler’s Formula Through Different Lenses*

**Authors(s):** Thomas Crawford CSUCI

**Abstract:** We are exploring the concept of Euler’s Formula and how it can be generalized to greater dimensions. We start by showing a construction of how to form the equation based on what we know about series. We can then look at the different applications of Euler’s Formula with the complex version and see what results naturally from using the Formula. Then use that to generalize to different dimensions to get similar equations in other spaces. And see what those higher-dimensional formulas can be used for in both real-world applications and how it can be used in different fields of mathematics. We were able to generalize to four dimensions. But now, we can ask how far can we go with Euler’s Formula, and what are the challenges with using it in higher dimensions? In what context did your research project arise?

**Advisor:** Dr. Ivona Grzegorzcyk

**Poster Area(s):** Analysis, Complex

**Presenter(s):** Chaway Li, Bonita High School; Shuer Xue, Bonita High School

**Title:** *Modeling Long Term Forest Area Trends and Forecasts in the World’s Largest Economies*

**Authors(s):** Chaway Li, Shuer Xue, Bonita High School

**Abstract:** This paper conducts an observational study of forest area change in the 11 highest-GDP countries from 1990 to 2022. For each country, a model of forest change over recent years is graphed, along with the  $R^2$  values for the predicted polynomial trend lines. The research examines sudden changes in forest data to determine the cause of these changes. The factors, including economic, cultural, and social factor and policies that might affect a country’s forest area coverage. We will then predict the forest cover percentage for each country, 20 years into the future, based on the given trend lines and predicted future events that might affect forest cover.

**Advisor:** Xiaoyan Liu

**Poster Area(s):** Analysis, Graph Theory/Combinatorics

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**Presenter(s):** Sam Offiah, University of La Verne

**Title:** *Predicting the 2026 NBA Champion Using Machine Learning*

**Authors(s):** Sam Offiah, University Of La Verne

**Abstract:** This study applies machine learning and simulation techniques to predict the winner of the 2026 NBA Championship using regular season data as of March 24th. Using the previous NBA season as a baseline, a model was developed incorporating approximately 25 team-based statistical variables, including win-loss records, scoring metrics, and roster characteristics. A Monte Carlo simulation with 6,000 iterations was used to estimate each team's probability of winning the championship. Some possible limitations include the lack of detailed injury data and limited consideration of individual player impact, which may affect predictive accuracy. Overall despite the limitations, this study demonstrates how data-driven modeling can be used to forecast outcomes in professional basketball and is a prime example of the growing role of analytics in sports. The ultimate goal is to have a consistent and adaptable model capable of predicting future champions by using the corresponding season's dataset

**Advisor:** Yousef Daneshbod

**Poster Area(s):** Analysis, Probability/Statistics

**Presenter(s):** Michael Minkoff, CSUCI; Antonio Flores, CSUCI

**Title:** *The Effect of Social Media and News on Cryptocurrency Price Volatility*

**Authors(s):** Michael Minkoff, Antonio Flores, Benito Ortiz, CSU Channel Islands

**Abstract:** This project explores how social media and news coverage affect the price volatility of cryptocurrencies. Cryptocurrency markets are highly sensitive to public attention, and prices can change quickly in response to online discussions, viral trends, breaking news, and celebrity influence. This study focuses on how these forms of media shape investor sentiment and contribute to sudden price increases and decreases in assets such as Bitcoin. By examining examples of major market swings, this project explains how speculation, fear, and hype can drive unstable price movement. The goal of this project is to better understand why cryptocurrency prices are so volatile and how media exposure influences decision-making in digital financial markets.

**Advisor:** Ivona Grzegorzcyk, Professor of Mathematics CSUCI

**Poster Area(s):** Analysis, Probability/Statistics

**Presenter(s):** Lea Froitzheim, CSUCI

**Title:** *Learning Formal Mathematical Proofs with Language Models in Lean*

**Authors(s):** Lea Froitzheim, CSUCI

**Abstract:** We explore the use of artificial intelligence to assist with generation of mathematical proofs in the proof-supporting environment called Lean. We train a small open-source language model on sample proofs to teach AI patterns used in formal logic proofs (including statements about infinite sets). The goal is to investigate whether such models can suggest valid solutions and support automated theorem proving. This work contributes an experimental framework for evaluating machine learning approaches to formal reasoning.

**Advisor:** Ivona Grzegorzcyk

**Poster Area(s):** Applied Mathematics, Logic, AI

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**Presenter(s):** Christopher Wang, Pomona College ; Sarah Marzen, Scripps College

**Title:** *Analyzing an organism's sensors using Maximum Entropy models with bias, variance, and confusion matrices*

**Authors(s):** Christopher Wang (Department of Natural Sciences, Scripps and Pitzer College, Claremont, California, USA), Elianna Schimke (Department of Natural Sciences, Scripps and Pitzer College, Claremont, California, USA), Tristan Kako (School of Arts and Sciences, Tufts University, Medford, Massachusetts, USA AND Pioneer Academics, Jenkintown, Pennsylvania, USA), Aiden Gao (Pioneer Academics, Jenkintown, Pennsylvania, USA), Martina Lamberti (Université Claude Bernard Lyon1, CNRS UMR5292, INSERM U1028, Sleep Team, Center for Research in Neuroscience of LYON, Bron, France AND Department of Clinical Neurophysiology, University of Twente, PO Box 217 7500AE, Enschede, The Netherlands), Joost le Feber (Department of Clinical Neurophysiology, University of Twente, PO Box 217 7500AE, Enschede, The Netherlands), Sarah Marzen (Department of Natural Sciences, Scripps and Pitzer College, Claremont, California, USA AND Kravis Department of Integrated Sciences, Claremont McKenna College, Claremont, California, USA AND National Institute for Theory and Mathematics in Biology, Chicago, Illinois, USA).

**Abstract:** Analyzing biological sensors has traditionally relied on mutual information between sensor signals and the environment, but this approach can be computationally intractable and reduces complex behavior to a single number. We propose an alternative framework: Stimulus-dependent Maximum Entropy models are used to construct estimators of environmental state given sensor state which then are characterized via bias, variance, and confusion matrices, providing an interpretable set of sensor performance metrics. For ordinal variables such as ligand concentration in cooperative binding models, we compute the bias and variance of these estimators, revealing that sensor cooperativity does not universally aid performance but depends on environmental context. For categorical variables such as neural activity states in cultured neurons, confusion matrices indicate that these systems exhibit memory but lack predictive capacity, complementing and extending results from mutual information analyses. Our framework is computationally efficient and characterizes how sensors respond to each individual environmental input.

**Advisor:** Sarah Marzen

**Poster Area(s):** Applied Mathematics, Probability/Statistics

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**Presenter(s):** Morgan Bohman, California State University Channel Islands; Jesse Hernandez, California State University Channel Islands

**Title:** *Signal Processing using Principal Component Analysis*

**Authors(s):** Noah Hester, Jesse Hernandez, Morgan Bohman, and Blake Wanamaker from CSU Channel Islands

**Abstract:** Principal Component Analysis (PCA), known in signal processing as the Karhunen–Loève Transform (KLT), is a fundamental method for representing high-dimensional signals in a compact and structured way. This project explores the mathematical foundations of PCA and its role in signal processing applications. Beginning with the covariance operator of a random signal, we apply the spectral theorem to obtain an orthonormal basis that diagonalizes the covariance matrix and orders components by variance. This transformation produces uncorrelated signal modes and provides an efficient representation in which dominant components capture most of the signal's energy. The project highlights how PCA emerges naturally from core results in linear algebra while serving as a powerful tool for signal representation, compression, and noise reduction. Emphasis is placed on the interplay between spectral theory and practical signal modeling in finite-dimensional settings.

**Advisor:** Dr. Ivona Grzegorzcyk

**Poster Area(s):** Applied Mathematics, Probability/Statistics

**Presenter(s):** Jack Matthews, California State University, Fullerton

**Title:** *Investigating Students' Conceptions of the Definite Integral*

**Authors(s):** Sam Sarrafi

**Abstract:** This study investigates whether students primarily hold procedural conceptions of integration or demonstrate a conceptual understanding grounded in accumulation. We examine how students interpret integrals after instruction, with particular attention to whether the accumulation construct is reflected in their reasoning. Specifically, we explore whether students rely mainly on the Fundamental Theorem of Calculus or can meaningfully conceptualize integrals as representing accumulated change. Twenty-nine students participated in the study. They responded to questions involving the symbolic representation of integral anatomy, their accounts of the Riemann sum, and a contextual prompt about what the definite integral represents. Preliminary findings suggest limited conceptual understanding. Only 4 of 29 students interpreted the differential as representing an infinitesimal change in time, and only 8 of 29 recognized  $f(t)$  as a rate. Just 2 students demonstrated both of these understandings. These results suggest many students apply procedural knowledge over a robust accumulation-based conception of integration.

**Advisor:** Amelia Stone-Johnstone, PhD

**Poster Area(s):** Math Education/Pedagogy

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**Presenter(s):** Abel Sekone, San Diego State University ; William Zahner, San Diego State University

**Title:** *Enhancing Expectancy and Utility Value in Business Calculus Through a Relevance Intervention*

**Authors(s):** William Zahner, SDSU; Abel Sekone, SDSU and UCSD

**Abstract:** This poster presents findings from a self study of a redesigned Business Calculus course aimed at strengthening students' expectancy and utility value for mathematics. Drawing from Expectancy-Value Theory, we examined how students understood mathematics in their intended careers through an assignment involving interviews with professionals in various fields. Our dataset includes 100 written reports collected over two semesters. Using two-cycle qualitative coding, we identified themes connected to expectancy such as increased confidence, mentorship, and clearer pathways into careers. We also identified themes related to utility including frequent use of spreadsheets, quantitative reasoning, and financial calculations. Although relatively few professionals reported using calculus directly, many described routine tasks (e.g., use of spreadsheets and financial calculations to make predictions) that rely on concepts foundational to calculus. These results suggest that structured relevance-building activities, within a broader course redesign, can positively influence business students' perceptions of the value and applicability of calculus.

**Advisor:** William Zahner

**Poster Area(s):** Math Education/Pedagogy

**Presenter(s):** Annika Koons, University of La Verne ; Aidan Galindo, University of La Verne

**Title:** *Instructor Impact on Students' Sense of Belonging in Calculus: A Gendered Comparison*

**Authors(s):** Annika Koons, University of La Verne, Aidan Galindo, University of La Verne, Casey Griffin, University of La Verne

**Abstract:** Feeling a low sense of belonging in STEM is a major reason why students leave their STEM majors, especially after taking Calculus. Our study explores students' perspectives from a two-semester active learning Calculus course. Specifically, we investigate ways students describe the impact of their instructor on their sense of belonging. Our findings suggest that students described the impact of the instructor in four ways: (1) instructor's pedagogical style, (2) students' relationship with the instructor, (3) students' relationships with classmates enabled by the instructor, and (4) instructor's character. In our poster, we unpack how each theme was expressed by students in each gender category and if there were any differences in themes across gender groups. What we hope to contribute is a snapshot of the student experience that describes how students of different genders felt supported by their Calculus instructor, and in turn, takeaways for Calculus instructors.

**Advisor:** Casey Griffin

**Poster Area(s):** Math Education/Pedagogy, Calculus

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**Presenter(s):** Jennifer Mota, CSU Channel Islands

**Title:** *Mathematics Education: A Layered Approach to Finding the Inverse of a Function*

**Authors(s):** Jennifer Mota

**Abstract:** In this thesis, we study a step by step visual method called the Layered Method that is designed to make the process of finding the inverse of a function easier to understand. This method breaks the process down into clear steps that guide learners' through each part of the solution process. Even high school students find the traditional swap and solve method confusing or at times hard to follow. The Layered Method offers a more structured and visual way to see how a function and its inverse are related. By expressing each operation in a layered manner, students are better able to understand the process and see the logic behind it. This approach is especially helpful for learners who benefit from visual aids and clear organization. In the end, our goal is to help students feel more confident and comfortable working with inverse functions. To see if our method benefits students, we conducted a two day study with six grade students and used statistical techniques to analyze the data. Our results show that the experimental group significantly outperformed the traditional control group on tasks related to finding inverse functions.

**Advisor:** Dr. Ivona Grzegorzcyk

**Poster Area(s):** Math Education/Pedagogy, College Algebra

**Presenter(s):** Carys Morgan Garvey, California Lutheran University

**Title:** *The Topology of Manifolds*

**Authors(s):** Carys Morgan Garvey, California Lutheran University

**Abstract:** This project explores the structure of topological manifolds through a unique blend of formal mathematics, pedagogy, and creative visualization. I investigated core concepts in topology—such as compactness, connectedness, separation axioms, and locally-Euclidean spaces—and how these properties define and constrain manifold structure. Alongside rigorous proofs and theoretical study, I wrote *Exploring Manifolds: A Guided Introduction through Topology and Analysis*, a 50-page pedagogical resource designed to make abstract concepts accessible to students through intuitive explanations, visuals, and cross-disciplinary analogies. In line with my passion for blending art and mathematics, I also developed an interactive Python-based tool that generates digital artwork by mapping vector fields onto smooth surfaces bounded by knots. This tool not only illustrates topological concepts but also serves as an artistic expression of the beauty and structure of topology.

**Advisor:** Dr. Nathan Carlson, California Lutheran University

**Poster Area(s):** Math Education/Pedagogy, Topology