Raul Marquez

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Education

University of Texas Rio Grande Valley — Edinburg, Texas
M.S. Mathematics, Thesis Track — 2025 - 2027 *(expected)*

- GPA: 4.00/4.00
- Advisor: Prof. Alexey Glazyrin
- Research area: Combinatorics in Extremal Set Problems
- Coursework: Algebra I, Advanced Analysis I, Partial Differential Equations, Probability and Statistics

University of Texas Rio Grande Valley — Edinburg, Texas
B.S. Mathematics, Concentration in Pure Mathematics, Minor in Physics — 2023 - 2025

- GPA: 4.00/4.00
- Coursework: Number Theory, Real Analysis I & II, Complex Variables, Modern Algebra I, Galois Theory

South Texas College — McAllen, Texas
A.S. in Mathematics — 2020 - 2023

- GPA: 4.00/4.00
- Coursework: Calculus III, Differential Equations, Linear Algebra

Publications

1. Arora, Palak & Bruda, Glenn & Fang, Bruce & **Marquez, Raul** & Miller, Steven & Prapashtica, Beni & Sharan, Vismay & Son, Daeyoung & Tang, Xueyiming & Waheed, Saad. (2025). Upper Bounds for the Lowest First Zero in Families of Cuspidal Newforms. *Journal of Number Theory*. 277. 10.1016/j.jnt.2025.02.012.
2. Bruda, Glenn & Cooper, Joseph & Jaber, Kareem & **Marquez, Raul** & Miller, Steven. (2024). Variants of Conway Checkers and k-nacci Jumping. 10.48550/arXiv.2408.08856.
3. Bruda, Glenn & Fang, Bruce & Gilman, Pico & **Marquez, Raul** & Miller, Steven & Prapashtica, Beni & Son, Daeyoung & Waheed, Saad & Wang, Janine. (2024). Stability of Matrix Recurrence Relations. 10.48550/arXiv.2408.12660.
4. Bruda, Glenn & Fang, Bruce & **Marquez, Raul** & Miller, Steven & Prapashtica, Beni & Sharan, Vismay & Son, Daeyoung & Waheed, Saad & Wang, Janine. (2025). The Limiting Spectral Distribution of Various Matrix Ensembles Under the Anticommutator Operation. 10.48550/arXiv.2502.00505.
5. Cashman, Caroline & Cooper, Joseph & **Marquez, Raul** & Miller, Steven & Shuffleton, Jenna. (2024). Hyper-bishops, Hyper-rooks, and Hyper-queens: Percentage of Safe Squares on Higher Dimensional Chess Boards. 10.48550/arXiv.2409.04423.

Talks

1. **Marquez, Raul**. Elliptic Curves: Understanding Their Significance and the Point Addition Operation. Stephen F. Austin University. *18th Texas Undergraduate Mathematics Conference*. October 28, 2023.
2. **Marquez, Raul**. Upper Bounds for the Lowest First Zero in Families of Cuspidal Newforms. Prarie View Texas A&M. *104th Annual Meeting of the Texas Section of the Mathematical Association of America*. March 29, 2025.
3. Bruda, Glenn & **Marquez, Raul**. Upper Bounds for the Lowest First Zero in Families of Cuspidal Newforms. University of North Texas. *37th Automorphic Forms Workshop*. May 3, 2025.

Research Experience

Graduate Research Assistantship / Undergraduate Researcher
UTRGV College of Mathematical and Statistical Sciences February 15, 2025 – Present

- Analyzed problems in extremal set theory to minimize distance sets in Hamming and Johnson Spaces
- Coded on several projects to incorporate the programs and theorems to further progress within the project
- Corresponded with other participants in a variety of projects and works to analyze solutions to research problems and develop papers intended for publication

Chief of Staff / Researcher
Williams College SMALL REU Program June 10, 2024 - August 10, 2024

- Worked with main program advisor to coordinate the official duties of important processes within the program
- Analyzed several problems within the field of mathematics concerning L-Functions, Fibonacci Sequences, Elliptic Curves, and Random Matrix Theory
- Corresponded with other participants in a variety of projects and works to analyze solutions to research problems and develop papers intended for publication

Work Experience

Academic Tutor
UTRGV Mathematics and Science Academy September 3, 2024 – December 15, 2024

- Educated several students on college-level proof-based mathematics on homework assignments, test preparation, and study habits
- Coordinated with tutors and faculty to ensure a cooperative learning for high school students of all backgrounds to have a fruitful learning experience

Academic Tutor
UTRGV College Assistance Migrant Program August 28, 2023 – December 18, 2023

- Educated several students personally and devised specific solutions to learning needs and requirements for undergraduate work in mathematics, sciences, and history
- Corresponded with tutors, mentors, and managers to devise the most effective solutions for students in different areas of education and their personal issues
- Facilitated healthy learning environment crucial for first-generation and migrant students to thrive in several scenarios and take advantage of their educational opportunities

Leadership & Activities

President
UTRGV Mathematical Society August 28, 2023 - Present

- Tutored oncoming students on problems concerning undergraduate-level work
- Organized events, meetings, fundraising to improve the club's funds and spread mathematics
- Communicated with corresponding members on fundraising events, organizing mathematics competitions, and designing the website
- Attended several mathematics-related lectures, presentations, and conferences outside of undergraduate work and class concerning a variety of topics in applied and pure mathematics

Volunteer
South Texas Astronomical Society July 20, 2023 - Present

- Promoted astronomical activities and science awareness in the Rio Grande Valley towards the general community
- Organized public events and cooperated with members to promote the organization's goals

Seminars and Reading Programs

Preliminary Arizona Winter School (PAWS) — Online Sychronous
University of Arizona — Fall 2024, Fall 2025
- Projects: Root Systems w/ Professor Melissa Emory, Analysis and implementation of algorithms in number theory w/ Juanita Duque-Rosero

Directed Reading Program — Online Synchronous
University of Texas — Summer 2025
- Projects: Algebraic Topology w/ Abhishek Shivkumar

Elliptic Curves Seminar — Edinburg, Texas
University of Texas Rio Grande Valley — Fall 2024
- Projects: Basics of Elliptic Curves w/ Debanjana Kundu

Awards and Honors

- **UTRGV Math Society Outstanding Overall Undergraduate**, May 2025
- **NSF S-STEM Mathematics Graduate Scholarship**, January 2025
- **Fall 2024 UTRGV Open Mathematics Competition Winner**, May 2024
- **Leona B. Cameron Scholarship in Math**, May 2024
- **Keppel Am-Fels Scholarship**, May 2024
- **UTRGV Math Society Outstanding Undergraduate Performance**, May 2024
- **Top UTRGV Putnam Scorer**, 2023,2024
- **UTRGV Presidential List**, January 2024 - Present
- **Presidential Scholarship**, May 2023
- **Engineering Design and Development People's Choice Award**, May 2023

Skills and Interests

Skills: Leadership, Communication, Teamwork, Problem-Solving, Writing, and Rhetoric.
Interests: Mathematics, Physics, Engineering, Politics, Writing, and Music
Programming: `Python`, `C++`, `Java`, `G-Code`, `MATLAB`.