Seth Nelson

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About

I am a PhD student in mathematics with a passion for mathematical research. I look forward to any opportunity to improve my mathematical knowledge.

Experience

- **Research with Dr. Eric Swartz** *Aug 2023 - Present*
  - We extended a previous paper by Udo Ott to develop new modular relations for sharply transitive automorphism groups of strongly regular graphs, and constructed new examples of strongly regular graphs with sharply transitive automorphism groups. This involved the following:
    - Generalizing previous theoretical work on the subject to a wider class of strongly regular graph.
    - Becoming proficient in utilizing High Performance Computing resources.
    - Developing a strong working knowledge of *GAP*.
    - Self-studying character theory from Martin Isaac's work *Character Theory of Finite Groups*.
    - Writing our results in an academic paper, which will be submitted for publication in a journal.

- **Research with Dr. Gexin Yu** *May 2023 - Present*
  - We analyzed the strong edge colorings of planar graphs with the condition that the degree sum of adjacent vertices be at most 7. We improved a previous upper bound for the minimal strong edge-coloring of planar graphs under this condition. Skills in this project involved:
    - Creating efficient and fast algorithms to find the coefficients on monomials in large polynomial expansions.
    - Python programming ability.
    - Writing an academic paper for publication in a journal.

- **Student Grader** *Aug 2024 - Dec 2024*
  - I graded Dr. Chuangtian Guan's Abstract Algebra I course. The course covered the fundamentals of rings and groups. My obligations were:
    - 4 hours of part-time work per week.
    - Providing complete and copious feedback to students.

Education

- **William & Mary** *Aug 2021 - May 2025*
  Prospective Bachelors of Science Williamsburg, VA
  - GPA: 3.92/4.00 Math GPA: 4.0/4.0

- **Freie Universität** *Aug 2023 - Dec 2023*
  Study Abroad Berlin, Germany

- **Flint Hill School** *Aug 2018 - May 2021*
  Highschool Oakton, VA

Manuscripts in Progress

The following papers are in progress:

1. *Character Theoretic Techniques for Nonabelian Partial Difference Sets* by S. Nelson and E. Swartz.
2. (Title Subject to Change) *Strong Chromatic Index of Planar Graphs with Ore-degree at Most 7 is at most* 13 by S. Nelson and G. Yu.

Conference Talks

1. I gave a talk on *Strong Edge Coloring of Maximum Degree 5 Planar Graphs* at the *ODU Mathematics Awareness Conference 2024*.

Honors and Awards

- **Cissy Patterson Fund Recipient** *April 2024*
  William & Mary
- **Dean's List all college semesters**
  William & Mary
- **FUSE Fund Recipient** *April 2024*
  William & Mary
- **Monroe Scholar** *April 2021*
  William & Mary
  - The award is given to those who "demonstrate intellectual depth, curiosity, concern for community and devotion to learning for learning's sake."

Coursework

- Linear Algebra
- Intermediate Linear Algebra
- Abstract Algebra I
- Abstract Algebra II
- Honors Elementary Analysis
- Intermediate Analysis
- Functional Analysis
- Multivariable Calculus
- Foundations of Mathematics
- Graph Theory and its Applications
- Differential Geometry
- Linear Algebra Methods in Combinatorics
- Ordinary Differential Equations
- Topology (Spring 2024)
- Honors Thesis

Skills

- **Programming Languages:** Python, *GAP*, Zshell, Bash, Matlab, (Somewhat proficient in) Singular
- **Other Tools & Technologies:** Working knowledge of HPC systems, UNIX-type OSs

Additional Information

Languages: English (Native), German (Read Fluently, Speak Conversationally)