Elijah Sanderson

Student at Tufts University

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Education

Tufts University 2021 – Present
MS, Mathematics (expected May 2023) Medford, Massachusetts

Wentworth Institute of Technology 2018 – 2021
BS, Applied Mathematics (expected August 2021) CGPA: 3.90 Math GPA: 3.98 Boston, Massachusetts

- Relevant courses: Single and Multivariable Calculus, Ordinary and Partial Differential Equations, Numerical Analysis, Linear Algebra, Probability and Statistics, Proof Writing, Abstract Algebra, Complex Analysis, Real Analysis, Operations Research

Academic Projects

- Meill, Butts, Sanderson, 2020: *Constraints on Maximal Entanglement Under Groups of Permutations* Fall 2020
  - Independent research project in completion of a co-op semester.
  - To be submitted to *Physical Review A*.
  - *Abstract*: We provide a simplified characterization of entanglement in physical systems which are symmetric under the action of subgroups of the symmetric group acting on the party labels. Sets of entanglements are inherently equal, lying in the same orbit under the group action, which we demonstrate for cyclic, dihedral, and polyhedral groups. We then introduce new, generalized relationships for the maxima of those entanglements by exploiting the normalizer and normal subgroups of the physical symmetry group.
  - arXiv link: https://arxiv.org/abs/2011.14507
- Sanderson, 2020: *Modern Algebra in Modern Music: Understanding sound through a mathematical lens* Fall 2020
  - Seminar presentation of the vector space of all sounds with analysis based in inner product spaces and Fourier analysis.
  - GitHub link: Here
- LeBlanc, Liberatore, Sanderson, 2019: *Fermat Numbers, Goldbach's Theorem, and the Infinitude of Primes* Fall 2019
  - Analyzed properties of Fermat numbers using mathematical induction.
  - GitHub link: Here
- Butts, Leblanc, Sanderson, 2019: *Free Groups* Fall 2019
  - Abstract Algebra final paper which analyzes the properties and applications of free groups.
  - GitHub link: Here
- LeBlanc, Sanderson, 2019: *Java Periodic Table* Spring 2019
  - Computer Science II final project which gives the user an interactive graphical display of the Periodic Table of the Elements.
  - GitHub link: Here
- Akgun, Sanderson, Schmuch, 2018: *SIR Model Using Vaccinations* Fall 2018
  - Foundations of Applied Math final paper which analyzes the theory and implementation of SIR models using R on a given population to measure the effect of a disease.
  - GitHub link: Here
- Sanderson, 2018: *Optimization: A Method to Expand Binomials Raised to the nth Power, where $n \in R$* Spring 2018
  - IB HL Mathematics Internal Assessment which analyzes a method to extend the definition of the binomial expansion to those which have non-integer powers.
  - GitHub link: Here
- Sanderson, 2018: *Finding an Unknown Variable Based on the Equation for the Launch Angle* Spring 2018
  - IB HL Physics Internal Assessment which examines the formula for launch angle of a projectile and attempts to mathematically manipulate the equation to figure out an unknown quantity.
  - GitHub link: Here

Skills

- Software: MATLAB, Mathematica, Adobe Suite, Microsoft Office, Logic Pro
- Programming languages: LaTeX, R, Java, JSON, Python
- Interests: Analysis, Number Theory, Group Theory, Topology, Algebraic Geometry, Quantum Physics and Relativity

Awards and Extracurriculars

- Currently employed as a dedicated maths tutor for Single and Multivariable Calculus, Differential Equations, Linear Algebra, and Discrete Mathematics at Wentworth.
- Achieved Dean's List for each semester at Wentworth.
- Member of Wentworth Society of Industrial and Applied Mathematicians (2019-present).
- Member of Wentworth Billiards (2018-present).
- Coordinated Wentworth's team for the 80th Putnam Competition; top scorer at WIT; top 43% overall.
- Compose and produce music using Logic Pro.
- Fully designed and programmed "maps" for *Minecraft* which can be downloaded and played by anyone online.

References

Dr. Alexander Meill
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Department of Sciences
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Dr. Mark Mixer
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Associate Professor
Department of Applied Mathematics
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