Kareem Jaber

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Education

Princeton University — Princeton, NJ
A.B. in Mathematics, GPA 3.960 — Aug. 2022 – Present
Expected minors in Computer Science and Teacher Preparation
Relevant coursework:

- **Analysis**: Real and Complex Analysis, Functional Analysis
- **Algebra**: Linear and Abstract Algebra, Commutative Algebra, Representation Theory, Algebraic Number Theory
- **Topology**: Point set Toplogy, Algebraic Topology
- **Combinatorics and Probability**: The Probabilistic Method, Algebraic Combinatorics (independent work)
- **Programming**: Systems programming, Functional programming (OCaml)

Thomas Jefferson High School for Science and Technology — Alexandria, VA
GPA 4.450, SAT 1550 — Aug. 2018 – Jun. 2022

Research and Relevant Experience

SMALL Williams REU | Willams, MA — Summer 2024

- Researched point configurations over finite fields with Professors Eyvindur Palsson and Alex Iosevich, resulting in a paper and a talk at the 2024 Young Mathematicians Conference
- Researched the distribution of low-lying zeros of L-functions with Prof. Steven J. Miller, resulting in a paper

Undergraduate Course Assistant | Princeton Intro Analysis Sequence — Sept. 2023 – Present

- Assist with material in set theory, linear algebra, topology, metric spaces, multivariable analysis, and differential geometry
- Help first years form a supportive community as they enter university
- Write companion notes for the course material to aid students' understanding and intuition

Engineering Teacher | Kuching, Malaysia; International Internship Program — Summer 2023

- Worked at Chumbaka, an engineering education company in Malaysia; co-taught their coding and electronics curriculum in after-school programs; trained teachers in using material in their classrooms; contributed to company-wide curriculum development and R&D meetings
- Assisted in adapting Chumbaka's "Coding and Algorithm" course for offline use, hosting material on a Raspberry Pi to make accessible to rural schools
- Mentored a group of secondary students designing a device to track hemorrhagic shock treatment information in a hospital environment; students won first place in regional competition and are now working closely with Sarawak emergency room doctors

Combinatorial Knot Theory Research | Polymath Jr REU — Summer 2022

- Collaborated virtually for 8 weeks under the guidance of Prof. Alex Zupan, University of Nebraska–Lincoln, focused on n-colorings of symmetric union presentations

- Established the determinant of a knot as a sufficient condition to identify non-symmetrically related knots, and constructed an infinite family of knots with the same determinant but not symmetrically related

Mathematics and Education Outreach Summer 2020 - present

- Run math circle after-school programs at several local elementary schools in the Princeton community
- Organize and administer Princeton Splash, an annual education outreach event for high school students
- Represented Princeton at SplashCon 2024, a conference at MIT to learn more about effective education outreach
- Write expository mathematics papers on problem solving and undergraduate mathematics for high schoolers

Electronics Lead | TJ REVERB Fall 2021 - Summer 2022

- Collaborated with a team of high schoolers and mentors to design and build a small satellite
- Researched the strength of Iridium radio communication along the ISS's orbit
- Focused on PCB design and Raspberry Pi implementation, and contributed to Python flight software, CAD, and final assembly
- Presented at SmallSat 2022 on "Identifying and Overcoming Challenges in High School CubeSat Programs" in Utah
- Cubesat launched on 11/26/2022 on SpaceX CRS-26 to the ISS, deployed from ISS on 12/29/2022

Other Leadership Roles

Princeton University Residential College Advisor, act as the first line of support for a group of freshman as they acclimate to college

Outdoor Action Orientation Leader lead backpacking trips for incoming freshmen, certified in Wilderness Advanced First Aid

Awards and Honors

Putnam 2023 Top 500

Princeton University Shapiro Prize For Academic Excellence 2023

Runner up in Steven H. Strogatz Prize for Math Communication 2022 for paper "The Unsolvable Configuration of the 15 Puzzle and an Interesting Approach to Abstract Algebra"

Classiq Quantum Computing Competition, 1st Place Youth Prize and 3rd Place Overall, 2022

Two-time AIME qualifier, 2021 and 2022

Skills and Interests

Programming: Proficient in Python and C, knowledgeable in OCaml, C++, Java, Linux, web development

Personal Skills: Reflective and adaptive, creative and unconventional, curious and inquisitive

Fun Interests: Piano performer and composer, 3D printed puzzle designer, rock climber, rubber duck collector