Preston Fu

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Education

Saratoga High School   GPA: 4.52/4.00

2022

SAT: 1590, **ACT:** 36
Coursework: Multivariable Calculus, Linear Algebra, Differential Equations, Data Structures, Graph Theory, Real Analysis
Certifications: Algorithms Specialization, Deep Learning Specialization, Machine Learning
Activities & Societies: Math Club President, Engineering Club President, Superintendent Advisory Board, Saratoga Falcon newspaper Opinion Editor, Varsity Tennis Player

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Experience

Co-founder, Program Coordinator · Everaise Academy

2020–now

- 501(c)(3) non-profit school enabling free access to education for aspiring scientists.
- Recruited and led 50+ staff to teach 1500+ students from 40+ countries.
- Raised $15k in sponsorships.
- Edited and published 3 textbooks: *Math Competitions 1*, *Physics Mechanics*, *Astronomy*.
- Directed web and curriculum development, competitions and events, logistics, finance.

Research Intern · Boston University RISE   🔗 **Poster · Abstract · Talk** (0:22:14)

2021

- Developed locomotion and food collection environments for fast prototyping and performance measurement of reinforcement learning algorithms.
- Reduced dimensionality of robotic model's action space through principal component analysis on virtual actuators.
- Worked under Principal Investigator and Professor Yannis Paschalidis of the Neuro-Autonomy Research Initiative.

Junior Counselor · Ross Mathematics Program

2019–2020

- Mentored students in Algebraic Number Theory.
- Teaching assistant for advanced courses in Analytic Number Theory, Topology, Equidistribution.

Math Curriculum Developer · AlphaStar Academy

2019

Wrote challenging problems for middle and high school students.

Publications

[1] *Math Beyond the Classroom*, Oct 2020.   🔗 **Amazon Paperback**
An overview of topics in mathematics: complex numbers, principle of inclusion-exclusion, power of a point, modular arithmetic, and more.
Raised funds for complimentary need-based copies read by middle and high school students and teachers nationally; featured by Minnesota State MATHCOUNTS.

Skills

Languages   Python, Java, C++, JavaScript
Technologies React, NumPy, Pandas, Matplotlib, Scikit-learn, TensorFlow/Keras

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Projects

Gaussian Mechanism as Protection from Sensitive Input Memorization   🔗 **Paper · Github**

2022

An investigation of the quantitative and qualitative properties of differential privacy in real-world usage. A case study in protecting PIN numbers from perplexity-based attacks on an LSTM model via Gaussian noise sampling.

Lifting Properties and Classification of Covering Spaces 🔗 **Paper**

2021 Covering maps, path- and homotopy-lifting, relationship to fundamental group, universal cover, connection to the Galois correspondence. Student author at Stanford University Math Camp, Program II in Algebraic Topology.

What Learning Looks Like 🔗 **globalstudentsquare.org**

2020 Allowing students from across the world (10+ countries, 5 continents) to share experiences and perspectives amid the COVID-19 pandemic. Student author and front-end developer at Newsroom By the Bay. Featured by **Chalkbeat**.

Matrix Lie Groups and the Lie group–Lie algebra correspondence 🔗 **Paper**

2020 Matrix exponentiation, tangent spaces, Lie bracket, Baker–Campbell–Hausdorff formula. Student author at Euler Circle, Abstract Algebra.

3-adic Identities on $\sum_{i=0}^{n-1} \binom{2i}{i}$ 🔗 **Presentation Notes**

2019 Alternate proofs of results originally published in American Math Monthly via Hensel's lemma and multivariable calculus. Student presenter at Euler Circle, p-adic Analysis.

Leadership

Head Coach, Liaison, MATHCOUNTS Lead Coordinator · Toga Junior Math Club

2018–now
- Created comprehensive 3-year rotating curriculum. Led 15 high school volunteers to teach weekly classes to middle school students.
- Organized club events, contest participation. Facilitated communication between administrators, volunteers, parents, and students.
- Organized testing logistics, proctoring, and grading for South Santa Clara Valley MATHCOUNTS Chapter (12 local middle schools).

President · Boys Team Charity, Saratoga Chapter

2017–now
- Organized guest speaker and charity events for a volunteer chapter of 130+ members.
- Set up a computer system and math problem database for low-income K-5 students at Sunday Friends Community center. Designed STEM projects and led math and science activities.

Awards

USA Junior Math Olympiad	2020 Top 80 Nationally
USA Physics Olympiad	2021 Honorable Mention, Top 150 Nationally
USA Computing Olympiad, Gold Division	2018
Canadian Open Mathematics Challenge	2021 Honorable Mention, Top 8 Internationally
American Regions Mathematics League	2020–2021 Top 30 Nationally · Team 1st
Physics Bowl	2021 Team 2nd Nationally, Division I
US Math Competition Association	2020 Team 4th Nationally, Premier Division
Tests of Engineering Aptitude, Math, Science	2019–2020 National Qualifier
California Math Council Certificate Award	2021
National AP Scholar	2020