Jonathan Liu

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EDUCATION

University of California, Berkeley, Berkeley, CA

August 2016 - Present

3.853 GPA, pursuing a double major in Computer Science and Math.

RESEARCH INTERESTS

Algorithmic Game Theory, Algorithms, Complexity Theory.

RESEARCH EXPERIENCE

Research Apprentice, Séquin Lab — *August 2018 - Present*

Works to develop an optimization algorithm for assembling mathematical knots from joint-like components. Algorithm and visualization tools are written in Rust, supplemented by data analysis done in Python. Supervised directly by Professor Carlo Séquin.

See https://github.com/SelectricSimian/knot-optimization.

Independent Research, UC Berkeley — *May 2019 - September 2019*

Investigated global extensions of Lovász Local Lemma and the Moser-Tardos Algorithm, answering questions about the existence of solutions to low-degree k-SAT problems with certain weak global properties and how our understanding of Algorithmic Lovász Local Lemma can be improved to find them. Supervised by Professor Prasad Raghavendra.

CONFERENCE PAPERS

C. H. Séquin, W. Brandon, **J. Liu**. "Modular Construction of Symmetrical Knots." SMIFASE 2019.

LEADERSHIP

President, Undergraduate Theoretical Computer Science — *August 2018 - Present*

Organizes and leads meetings for the club Undergraduate Theoretical CS (UGTCS) at Berkeley. The club hosts reading groups where students interested in theory can study interesting research-related topics and get advice from professors at Berkeley. Interesting recent topics included Theoretician's Toolkit and Algorithmic Game Theory. See https://ugtcs.berkeley.edu/.

WORK EXPERIENCE

Curriculum Intern, Art of Problem Solving, Inc. — *May 2018 - August 2018*

Worked to develop various aspects of math curricula for students from 4th to 12th grade. Responsibilities included lesson planning, activity creation, teaching, problem writing, and close reviews of coworkers' work. Analyzed relevant course data to refine and improve material as well.

TEACHING EXPERIENCE

UGSI - Math W53, UC Berkeley — *June 2019 - August 2019*

Taught one section (35 students) of Math W53 (Multivariable Calculus) through an online course format. Maintained constant stream of communication with the students and monitored student progress to ensure that students were not falling behind, especially given that the course was condensed from 18 weeks to 8 weeks long.

UGSI - Math 1B, UC Berkeley — *August 2018 - December 2018*

Taught two sections (50 students) of Math 1B (Calculus 2). Responsibilities included 6 hours of instruction per week as well as lesson planning, worksheet creation, and grading. Also handled administrative work including gradebook management, forum monitoring, and online grading. Received an average rating of 6.7/7 from students.

Sitewide Forum Administrator, Art of Problem Solving, Inc. — May *2018 - Present*

Monitor the student forums for all Art of Problem Solving online classes. This entails engaging with students and providing meaningful guidance for their problem sets and general math questions.

SELECTED TALKS

"Prophet Inequality." Algorithmic Game Theory Reading Group — 10/8/19.

"Pseudorandom Generators via Random Walks." Spectral Graph Theory Reading Group — 11/7/19

"Pseudorandomness." Theorist's Toolkit Reading Group — 4/29/19

"The Dimension Argument." Theorist's Toolkit Reading Group — 2/4/19

COURSEWORK

Computer Science

CS 61B – Data Structures
CS 61C – Machine Structures
EECS 126 – Probability and Random Processes
CS 170 – Efficient Algorithms and Intractable Problems
CS 270 – Graduate Combinatorial Algorithms and Data Structures
CS 276 – Graduate Cryptography
CS 294-153 – Graduate Probabilistically Checkable and Interactive Proofs

Math

Math H53 – Honors Multivariable Calculus
Math 54 – Linear Algebra
Math 55 – Discrete Math
Math H104 – Honors Introduction to Real Analysis
Math 110 – Linear Algebra
Math 113 – Abstract Algebra
Math 115 – Number Theory
Math 135 – Set Theory
Math 172 – Combinatorics
Math 185 – Complex Analysis
Math 224A – Mathematical Methods for the Physical Sciences
Math 249 – Algebraic Combinatorics