

Ben-Zion Weltsch

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Education

UC Berkeley

Berkeley, CA

BA in Mathematics with Honors

May 2022

GPA: 3.8

(expected graduation date)

Work Experience

UC Berkeley

TA

Summer 2021

I was a teaching assistant for Math 1B - Calculus, Math 113 - Abstract Algebra, and Math 136 - Incompleteness and Undecidability at UC Berkeley. I created rubrics for and graded homework, exams, and other assignments.

Chabad Hebrew Academy

Computer Science Elective Teacher

Fall 2019 - Spring 2020

I taught an elective computer science course to a class of middle school students over three trimesters. The beginning of the course focused on the basics of programming principles through Python. For the majority of the course, we created simple games, such as Pong and Space Invaders, through the turtle module. I programmed the graphics and general framework, and the students were tasked with filling in the game logic.

Mathnasium

Instructor

Spring 2019 - Fall 2020

I taught and shared my passion for mathematics with children ranging from kindergarten to high school who came from many different educational backgrounds. I also fulfilled extra administrative and clerical tasks.

Skills

Software

Microsoft Excel, QuickBooks

Programming

Proficient in: Python (TensorFlow, Pandas, SciPy, NumPy), SQL

Research Experience

A Friendly Introduction Zero Sharp

For my senior thesis I am writing an expository paper on 0^\sharp , a set-theoretic object that encodes some information about the constructible universe, L . In particular, the existence of this object implies that L is very far from the true universe of sets: if 0^\sharp exists, L contains only countably many reals and every uncountable cardinal is inaccessible in L . On the other hand, the nonexistence of 0^\sharp implies that L closely resembles the true universe of sets: Jensen's covering lemma holds, so every uncountable set is closely approximated by a constructible set. It is important here that the existence of 0^\sharp cannot be proved or disproved from ZFC , the usual axioms of set theory. There are many characterizations of 0^\sharp : an elementary embedding from L to itself, an iterable mouse, the set of Gödel codes of true formulas about indiscernibles for L , and even determinacy of infinite games for Π_1^1 sets of reals.

Set Theory, Forcing, and Large Cardinals

Over Summer 2021 I worked on an independent study and research project with Dr. Gabriel Goldberg. The research focused on constructing models of set theory satisfying certain properties that are not provable from the usual axioms of mathematics. These models are constructed via Cohen's method of forcing where one takes small set-theoretic universes and "forces" new objects into the universe. The study and research ended with a short paper on the continuum hypothesis and many methods of forcing its truth or failure and surrounding combinatorial principles, as well some embedding properties of large cardinals.

Coursework

Here are some relevant courses I took (or am taking currently), sorted by department and descending course number. Classes numbered 0-99 are lower division, 100-199 upper division, and 200+ are graduate level.

Mathematics

Math 296 - Descriptive Set Theory

Math 290 - Set Theory Seminar

Math 236 - The Metamathematics of Set Theory

Math 225B - Metamathematics

Math 225A - Metamathematics

Math 199 - Guided Independent Study and Research

Math 196 - Honors Thesis

Math 185 - Complex Analysis

Math 142 - Algebraic Topology

Math 136 - Incompleteness and Undecidability

Math 115 - Number Theory

Math 113 - Abstract Algebra

Math 110 - Linear Algebra

Math 104 - Real Analysis

Math 55 - Discrete Math

Math 54 - Linear Algebra and Differential Equations

Math 53 - Multivariable Calculus

Math 1B - Calculus

Math 1A - Calculus

Computer Science

CS 170 - Efficient Algorithms and Intractable Problems

CS 61B - Data Structures

CS 61A - The Structure and Interpretation of Computer Programs

Physics

Physics 137A - Quantum Mechanics

Physics 5B - Electromagnetism, Waves, and Optics

Physics 5A - Mechanics and Relativity

Linguistics

Linguistics 252 - Computational Linguistics

Other interests

I enjoy playing guitar, skateboarding, and woodworking in my free time.