

# Hannah Friedman

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## EDUCATION

Harvey Mudd College, Claremont, CA  
Bachelor of Science, Mathematics, GPA: 3.9/4.0

Expected May 2023

## AWARDS & HONORS

**Giovanni Borrelli Mathematics Fellowship**, Harvey Mudd College 2021 - 2022

*Conferred on one or two junior mathematics majors in recognition of the ability to complete high quality research independently or in tandem with a faculty advisor.*

**Courtney S. Coleman Prize**, Harvey Mudd College 2021 - 2022

*Awarded to three rising juniors who excel in mathematics.*

**Dean's List**, Harvey Mudd College 2020 - Now

## RELEVANT COURSES

Mathematics: Galois Theory, Representation Theory, Abstract Algebra I, Real Analysis II, Real Analysis I,  
Probability and Statistics, Numerical Analysis, Partial Differential Equations, Math of Democracy  
Computer Science: Data Science, Algorithms, Data Structures/Program Development  
Physics: Mechanics & Wave Motion, Electricity & Magnetism

## SKILLS

Programming Languages: Python, MatLab, Macaulay2, Java, Racket, C++, R,  
Languages: English (fluent), German (fluent), Mandarin (proficient), Hebrew (proficient)

## RESEARCH EXPERIENCE

**Borrelli Fellow**, Harvey Mudd College Summer 2022

INDEPENDENT PROJECT ADVISED BY PROF. MICHAEL ORRISON

*Discovered new connections between representation theory, fixed point statistics, and symmetric functions*

- Studied permutation statistics through algebraic and harmonic analysis lenses
- Derived a new permutation statistic and related it to existing functions using symmetric function theory
- Conducted literature reviews and developed a computational framework for testing conjectures

**Mathematics Department**, Harvey Mudd College Spring 2022

TEAM OF FOUR UNDERGRADUATES ADVISED BY PROF. JAMIE HADDOCK

*Created a distance measure for datasets using joint nonnegative matrix factorization*

- Modified a supervised machine learning technique to create a distance measure for data sets
- Tested our method on data sets using Python
- Wrote the method and experiment sections of our paper

**Mathematics Department**, Harvey Mudd College Fall 2021 - Spring 2022

TEAM OF FOUR UNDERGRADUATES ADVISED BY PROF. HAYDEE LINDO

*Investigated relationships between trace ideals and other ideals in commutative rings*

- Posed research questions after independently learning background material for research project
- Studied the trace ideals of numerical semigroup rings and how trace carries over primary decomposition
- Used algebraic software to generate examples

**Computer Science Department**, Harvey Mudd College Summer 2021

TEAM OF THREE UNDERGRADUATES ADVISED BY PROF. LUCAS BANG

*Created a new method for performing symbolic execution using linear algebra and graph theory*

- Optimized an algorithm that utilizes fast matrix multiplication to perform symbolic execution
- Designed and performed tests comparing matrix symbolic execution method to traditional symbolic execution

## PUBLICATIONS & PRESENTATIONS

“An Interpretable Joint Nonnegative Matrix Factorization-Based Point Cloud Distance Measure” (with Amani R. Maina-Kilaas, Julianna Schalkwyk, Hina Ahmed, and Jamie Haddock)

- Presented a poster at the Southern California Applied Mathematics Symposium, June 2022
- Paper submitted to the 57th Annual Conference on Information Science and Systems; see <https://arxiv.org/pdf/2207.05112v2.pdf>

“A New Basis for  $k$ -Local Class Functions” (with Michael Orrison)

- Presented a poster at the Claremont Center for the Mathematical Sciences poster session, August 2022
- Will present in the Pi Mu Epsilon Contributed Session on Research by Undergraduates at the 2023 Joint Math Meetings

## WORK EXPERIENCE

**Tutor/Teaching Assistant**, Harvey Mudd College

Spring 2021 - Now

- Help students develop intuition and answer questions about Calculus, Linear Algebra, Differential Equations, Discrete Math, Abstract Algebra I, Harmonic Analysis on Finite Groups, Data Science, and Principles of Computer Science

**Grader**, Harvey Mudd College

Fall 2020 - Now

- Grade weekly or biweekly homework sets for Calculus, Linear Algebra, Abstract Algebra I, and Harmonic Analysis on Finite Groups

## LEADERSHIP EXPERIENCE

**President, Women in Math**, Harvey Mudd College

Fall 2022 - Spring 2023

- Support women in mathematics and strengthen the mathematics community by fostering connections between underclassmen, upperclassmen, and alumni (as mentorship coordinator 21-22)
- Recruit new leadership members
- Host math department speakers and organize ushers for speaker events
- Organize social and networking events for women interested in math

**Sustainability Director**, Harvey Mudd College Student Government

Fall 2020 - Spring 2022

- Coordinated and supported teams of undergraduate volunteers on various projects focused on increasing campus sustainability