

CONTACT	Email: <a href="mailto:fecheng@berkeley.edu">fecheng@berkeley.edu</a> Phone: +1 (530) 574-5845 GitHub: <a href="#">fredcheng02</a>
EDUCATION	<div> <b>University of California, Berkeley</b> August 2022 – May 2024            Double Majoring in Mathematics and Statistics            Dean's Honors List awarded for fall semester 2022            (Cumulative* UC GPA: 3.928/4.0)         </div> <div> <b>University of California, Davis</b> September 2020 – June 2022            Majored in Mathematics            Dean's Honors List awarded for five quarters            (Davis GPA: 3.934/4.0)         </div>
AWARDS	<div> <b>Robert Lewis Wasser Memorial Scholarship</b> June 2022            Winner of the <a href="#">UC Davis Robert Lewis Wasser Math Contest</a> </div> <div> <b>G. Thomas Sallee Prize</b> June 2021            Winner of the <a href="#">UC Davis Spring Math Contest</a> </div>
RESEARCH AND PROJECTS	<div> <b>Polymath Jr. Research Program</b> on the frog model on trees June 2023 – September 2023            Under the guidance of Professor <a href="#">Matthew Junge</a> and Professor <a href="#">Si Tang</a>, we submitted a new paper on the frog model to the <i>Electronic Communications in Probability</i> (<a href="#">arXiv:2309.14443</a>). The frog model is an interacting particle system of significance in statistical mechanics, and we focused on its setting on the infinite <math>d</math>-ary tree.  <i>I was a major research investigator.</i> On the computer-assisted proof and numerical computation side, I notably improved the upper bounds on the phase transition threshold <math>\sup_{d \geq m} p_d</math>. On the theoretical side, I rigorously proved the strict monotonicity of a related threshold <math>q_d</math> in <math>d</math>. More information can be found on the arXiv preprint and at the GitHub repository <a href="#">fredcheng02/frog-model</a>.            In January 2024, I led my group members to present at the AMS-PME poster session and the AMS Polymath Jr. special session at the JMM in San Francisco.         </div> <div> <b>Independent Study</b> on high-dimensional probability May 2023 – September 2023            Read Roman Vershynin's <a href="#">High-Dimensional Probability</a> under the guidance of my machine learning professor, <a href="#">Nikita Zhivotovskiy</a>. The graduate-level book focuses on concentration results in high dimensions, with important implications to areas of data science and statistical learning theory.         </div> <div> <b>Directed Reading Program</b> on generating functions October 2021 – May 2022            The Directed Reading Program is an undergraduate self-study program under a graduate mentor. In my group, I studied generating functions based on Herbert Wilf's book <a href="#">Generatingfunctionology</a>. Generating functions form an important topic in combinatorics that connects counting and recurrence problems to power series. I presented my reading result at the end of the academic year before other groups, graduate students, and teachers.         </div> <div> <b>Pioneer Research Program</b> on extremal graph theory July 2019 – September 2019            Conducted research and wrote an <a href="#">expository thesis</a> on the fundamentals of extremal graph theory under professor <a href="#">Carl Yerger</a> from Davidson College; received an A grade         </div>

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\*Berkeley and Davis GPAs are automatically combined.

COURSEWORK AND KNOWLEDGE	<p><b>Probability &amp; Statistics:</b></p> <ul style="list-style-type: none"> <li>• probability theory &amp; stochastic processes <ul style="list-style-type: none"> <li>– including introductions to probabilistic methods in combinatorics, MCMC, mixing times, high-dimensional probability, and random matrices</li> </ul> </li> <li>• mathematical statistics &amp; linear models</li> <li>• machine learning</li> <li>• causal inference</li> <li>• information theory</li> <li>• game theory</li> </ul> <p><b>Mathematics:</b></p> <ul style="list-style-type: none"> <li>• 1st year graduate measure theory, general topology, &amp; functional analysis</li> <li>• single &amp; multivariable real analysis</li> <li>• complex analysis</li> <li>• advanced linear algebra</li> <li>• groups, rings, fields, and Galois theory</li> <li>• algebraic topology</li> <li>• combinatorics &amp; graph theory</li> <li>• number theory</li> <li>• ordinary differential equations</li> </ul> <p><b>Math-related Philosophy and Logic:</b> proof-theoretic and model-theoretic results in PL and FOL; metalogic results in recursion and computability theory; philosophy of mathematics</p>
SKILLS	<p><b>Programming:</b> R (including tidyverse &amp; shiny), SageMath, Python, Wolfram Mathematica, SQL, C, Java, basic shell scripting</p> <p><b>Tools:</b> Linux command line, regular expressions, Git, Microsoft Office, L<sup>A</sup>T<sub>E</sub>X &amp; L<sup>y</sup>X</p> <p><b>Languages:</b> Mandarin Chinese (native), English (fluent)</p>
PERSONAL INTERESTS	philosophy, classical music, literature, astronomy