Andreas Hatziiliou

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Education

- **University of British Columbia** — Vancouver, BC
  Master of Science in Mathematics | GPA 4.0/4.0 — *Sept 2021 - May 2023*

- **McGill University** — Montreal, QC
  Bachelor of Science in Mathematics (Honours) and Computer Science (Minor) | GPA 3.64/4.0 — *Sept 2018 - May 2021*
  Distinction: First Class Honours in Mathematics

Experience

- **Graduate Research Assistant**
  University of British Columbia — *Sept 2021 - May 2023*
  - Finding elliptic curves of high rank and predicting quantities such as rank and order of Sha using machine learning models.
  - Generalized results from my previous paper to coefficients of form $\pm q^{\alpha}$ for $3 < q < 100$ prime using methods of Bennett et al.

- **Teaching Assistant**
  University of British Columbia — *Sept 2021 - May 2023*
  - Organizing and hosting office hours. Writing questions and solutions to assignments. Grading exams.
  - Head TA for the Mathematics Learning Centre (MLC)

  McGill University — *Fall 2020*
  - Responsible for grading the weekly assignments in Honours Complex Analysis using the Crowdmark plateform.

Selected Publications and Preprints

- **A quest for 5 dimensional Calabi-Yau Manifolds using Genetic Algorithms**
  Preprint available shortly. — *Feb 2024*
  - Coded a Genetic Algorithm in C to find reflexive polytopes in 5 dimensions. Used the PALP and EASEA libraries for computation and parallelization across a 3 Teraflop cluster. Made improvements to the Genetic Algorithm proposed by Berglund et al. in order to generate polytopes in a much larger search space.

- **Elliptic curves of prime conductor - an exploration of conjecture, data and bias**
  Masters Thesis, supplemental code available here — *October 2023*
  - I was granted access to a complete data set containing . Utilized Andrew Sutherland's C libraries *smalljac* and $ffpoly$ in order to optimize code which sieves through the data of all elliptic curves over $\mathbb{Q}$ of prime conductor $p \leq 2 \cdot 10^{13}$ classifies the rank of curves.
  - Analyzed whether the data fits the best current heuristics regarding models for invariants such as the rank r, the Tate-Shavarevich group $Ш$, the selmer group as well as many of the other invariants such as those which appear in the BSD conjecture.
  - Gave evidence towards previously undetected biases in certain invariants and conjecture as to why they occur.
  - Trained various Machine Learning models on our data set in order to build high accuracy probabilistic classifiers for quantities such as the rank and the analytic order of the Sha group $Ш$.

- **On admissible fourier coefficients of modular forms of weight 2 and 2k+1**
  Published in the Annales mathématiques du Québec — *June 2021*
  - For weight 2 normalized newforms $f(z)$ defined over $\mathbb{Q}$ and trivial residual mod 2 Galois representation we rule out or locate all odd prime values $|\ell| < 100$ of their Fourier coefficients $a(n)$ when n satisfies certain congruences. We also study the case of odd weights $k \geq 1$ newforms where the nebentypus is given by a quadratic Dirichlet character.

Awards

- UBC Faculty of Science Graduate Award 2022 and 2021

Technical Skills & Miscellany

- **Programming Languages**: Python, C, Nix, OCaml, LaTeX
- **Technologies**: Sage, Magma, PARI+GP , Bash, Pandas, Dask, Apache Parquet
- **Spoken Languages**: English, French, Greek
- **Citizenship**: Canadian, Greek