# ALEX KAZACHEK

## **EDUCATION**

### **University of Western Ontario**

2019 – 2023 (*Projected*)

HBSc in Mathematics & Data Science. GPA of 3.91.

## Awards

RBC Data Science Scholarship 2021 Fall

Albert O. Jeffery Scholarship 2021 Fall

Cecil G. Gracey Scholarship 2020 & 2021 School Years

#### **NSERC USRA**

2021 Summer

Borwein Memorial Prize

**Dean's Honour Roll** 2019 & 2020 School Years

## Skills

### **Programming**

Performing statistical analysis in R, such as simulation and estimating time series.

Computing with Mathematica to find entanglement measures.

Implementing cryptographic protocols in Python.

Creating static web sites using React.js.

### Design

Typesetting with LATEX and Markdown.

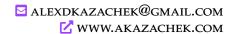
Creating dynamic documents with knitr and Jupyter.

Visualizing math and data with TikZ, Manim, and ggplot2.

## **ACADEMICS**

# Summer of Math Exposition 2021 Entry 2021 Summer

Co-created animated video with Jacqueline Đoàn, geometrically motivating and building intuition for the spectral theorem for normal operators. Over 30,000 views on YouTube.



#### MaCAW x PASA Coffee Seminar Talk

2021 Fall

*Title* How to Differentiate a Function That Has No Derivative *Modified Abstract* A Sobolev space consists of functions which admit weak derivatives. Being a Banach space, it is more well-behaved than the space of differentiable functions. Its definition is motivated by the Dirichlet problem, which is then solved via Stampacchia's theorem.

#### CUMC 2021 Student Talk

2021 Summer

*Title* A Mathematical Definition of Entanglement and Its Measurement

Modified Abstract Entangled states are formalized as operators over the tensor products of Hilbert spaces. On certain states, known as pure, the level of entanglement may be measured by entanglement entropy. This value may be extended to all states by the convex roof construction, yielding entanglement of formation.

## WORK EXPERIENCE

# University of Western Ontario | Undergraduate Marker 2021 Fall

Marking assessments for Mathematical Structures (Math 2155), covering logic, proof techniques, and set theory.

# University of Western Ontario | Research Assistant 2021 Summer

Assisted research in quantum state geometry and information theory. In particular, examined entanglement of states associated to certain Kähler manifolds. Supervised by Dr. Tatyana Barron and funded by NSERC.

# Clubs & Committees

# Canadian Undergraduate Mathematics Conference | Committee Member

2021 Summer

Created new website for this and forthcoming CUMCs. Implemented desktop and mobile support, and bilingual localization (English & French).

Organized the career and mathematical communication panels, as well as the Lean and Beamer workshops.

### Math Club at Western | VP Academics

2020 & 2021 School Years (on-going)

Launched biweekly mathematics contests for undergraduate students, and helping write and grade these contests.

Introduced student seminars, an opportunity for undergraduate students in mathematics or related disciplines to share their independent studies and projects.