# LOUIS-ROY LANGEVIN

### MATH & CS STUDENT WITH INTERESTS IN PROGRAMMING, PROBLEM SOLVING, AND TEACHING

## EDUCATION 🎓

**Master's thesis in Algorithmic Game Theory**  Sep 2024 - Dec 2025
Prof. Adrian Vetta at McGill University

**Bachelor in Joint Honours Math & CS**  Sep 2021 - Apr 2024
McGill University (3.91/4.0 GPA)

## RESEARCH EXPERIENCE ⚗

### Graph theory summer research (2023)

- Full-time project supervised by Prof. Sergey Norin from McGill university (Montreal Qc), and financed by the NSERC USRA (8350$).
- Studied the Burning Number conjecture using graph theoretical methods of proof. The final report can be found here.
- Implemented a complex linear program in Python to find lower bounds for various graph's burning numbers in polynomial time and to study the NP-completeness of the conjecture.

### Subelliptic operators summer research (2022)

- Full-time research directed by Prof. Suresh Eswarathasan from Dalhousie University (Halifax NS) funded by the ISM research award (5625$).
- The goal was to find the eigenfunctions of the Baouendi-Grushin operator, using MATLAB to approximate such functions with power series. The final report is linked here.
- Coded MATLAB scripts and used Maple to observe the zero-sets of normally distributed linear combinations of Legendre functions while minimizing computational efficiency loss.

## WORK EXPERIENCE 💼

### Grader and tutor

- Hundreds of cumulated hours of independent tutoring in math and physics at all levels.
- Grader in real analysis and discrete mathematics for McGill University.
- Math tutor under the charge of McGill University and Maisonneuve College.

### Owner of the company *Cégepien*

- Online resource to help cégep and high school students with math courses.
- Educational content creator with 15 000 followers on social medias (@le_cegepien). Publishing videos about mathematics, studying methods, the R score formula, and more.
- Sold and taught private preparation classes for calculus. 25 students registered (1500$+).

### Census enumerator for Statistics Canada (2021)

- Full-time job of consisting of giving phones calls and going door to door to help Montreal residents fill the Canadian census.
- Was classified among the 10 best workers in Montreal and sent to Kuujjuaq (Qc) to help native inhabitants fill the census.
- Developed a lot of communication skills and learned about probing methodology.

## PROJECTS 🖥 (my portfolio)

### String protagonist 🔗 (team)

- A guitar hero game but with a real guitar, implemented in 36 hours.
- Interactive front-end with animations coded in React and TypeScript.
- Able to detect guitar pitches with fast Fourier transforms, WASM, and a Rust neural network with 90% accuracy (binary cross entropy).

### Assembly fractal generator 🔗 (individual)

- An MIPS assembly program that generates different kinds of fractals depending on the parameters the user gives it using complex numbers.
- Additional feature that uses the randomness of complex square roots to draw the boundary of any given Julia set.

### Assembly image matcher 🔗 (individual)

- An MIPS assembly program that takes one big image and iterates through it to find any occurrence of some given smaller image.
- Implemented in a cache-friendly way to optimize the speed. Adapted to fully-associative and direct mapped caches.

### Library free neural network 🔗 (individual)

- Python script that creates neural networks without using any library.
- Back-propagation and gradient descent all implemented manually.
- Wrote this script after taking a math class applied to machine learning (MATH462) to increase my implementing skills and AI comprehension.

## LANGUAGES

**Fluent in French (native) and English**

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## CONTACT

✉ louisroylangevin3@gmail.com

in www.linkedin.com/in/louis-roy-langevin

○ https://github.com/LouisRoyLangevin

🌐 https://louisroylangevin.github.io/

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## SKILLS

**General programming**
- C++ / Java / Python / Rust / LaTeX

**Web development**
- HTML / CSS / JavaScript / React

**Machine learning**
- Neural networks / Regression methods / Natural language processing

**Mathematics**
- Graph theory / Algorithm design / Linear, convex, and nonlinear optimization / Probability / Statistics / Algebra / etc.

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## COMPETITIONS

**Concordia ConUHacks (2024)**
- Short interview on CBC here (8m20)

**McGill Code.Jam() hackathon (2023)**
- 2nd place at McGill (1375$)

**COMC math contest (2020)**
- Third place in Quebec
- Qualified for OMC math contest

**AMQ math contest (2019)**
- First place in Quebec + 250$
- Participation to the AMQ math camp