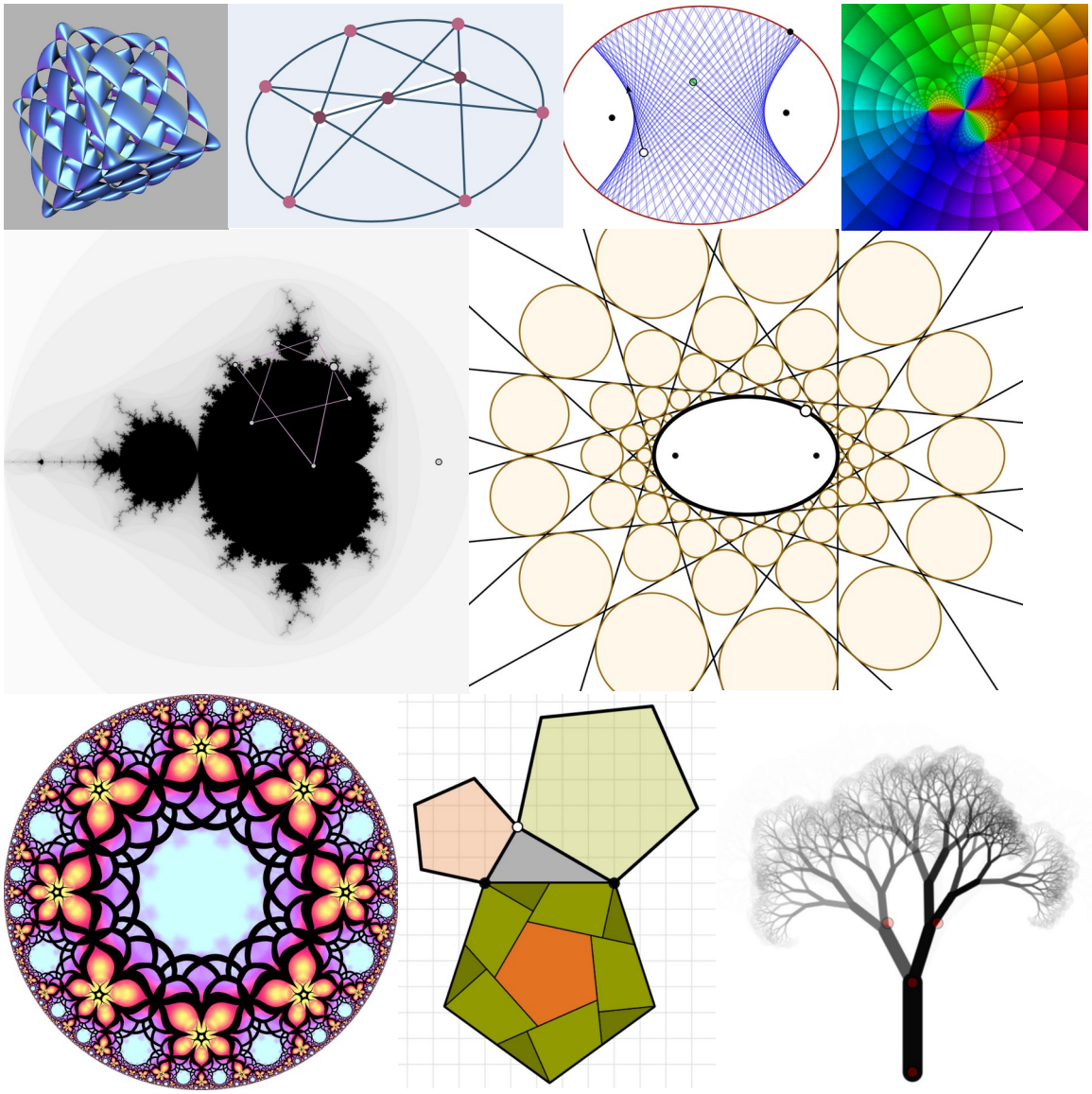
Speaker: Chaim Goodman-Strauss, Tim Reinhardt, Michael Martin Katenberger

Title: CindyJS: Browser-Based Interactive Visualizations

Abstract:
The workshop introduces CindyJS, an open-source JavaScript framework for creating interactive mathematical visualizations on the web.

Derived from the dynamic geometry program Cinderella, CindyJS brings geometric experimentation to the browser, enabling the creation of hands-on applets of geometric configurations in the projective plane and beyond. Participants will also discover CindyScript, an intuitive mathematical scripting language that integrates diverse mathematical concepts into illustrations – including GPU-based computation for real-time interactivity.

Through guided examples and practical exercises, participants will learn how to build dynamic web-based visualizations from the ground up. In the afternoons, small collaborative projects will offer opportunities to investigate mathematical questions and experiment with ways of communicating mathematics through illustration.



Speaker: Steve Trettel

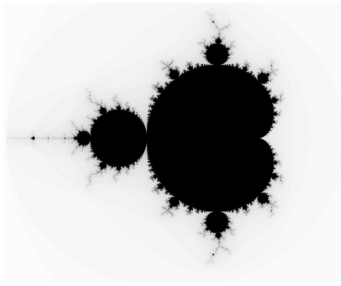
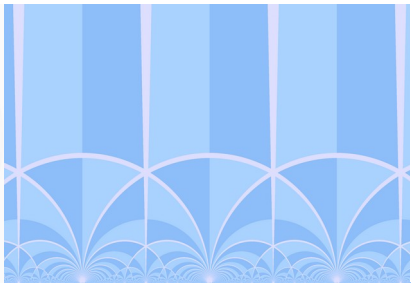
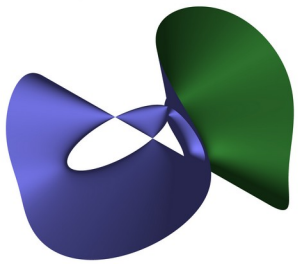
Title: GPU-Accelerated Mathematical Illustration: An Introduction to Shader Programming

Abstract:
This mini-course introduces shader programming as a tool for mathematical illustration and exploration. Shaders are programs that run in parallel on the GPU, making them exceptionally fast for visualization tasks. We'll learn to write code that "reads like mathematics" using Shadertoy, a beginner-friendly web-based platform that handles all the low-level programming complexities.

We'll progress from 2D foundations (curves, tilings, fractals) to 3D rendering via raymarching. Along the way, we will implement classic examples like the Mandelbrot set, hyperbolic tessellations, and implicit surface renderers. The final day will explore either advanced geometric techniques (domain operations, 3D fractals) or temporal simulation methods (PDEs, buffer-based dynamics), depending on available time and the group's interests.

No prior experience with shaders or GLSL is required—only a strong foundation in undergraduate mathematics and willingness to experiment with code through daily homework exercises.

Images that we will create:

Speaker: Sylvie Benzoni-Gavage

Title: Designing complete maps

Abstract:
The "other map coloring theorem" proved by Gerhard Ringel and John William Theodore Youngs in the late 1960s - before the four color theorem - gives the chromatic number X of a closed orientable surface in terms of its genus. It does not tell how to actually design a maximal complete map on a given surface, that is a map with exactly X regions such that every pair of regions shares a boundary line. I will recount my quest for such maps on the Rulpidon, a genus-3 surface designed by the French sculptor Ulysse Lacoste.

Link https://math.univ-lyon1.fr/perso/sylvie-benzoni-gavage/rulpidon/ (in French)

Speaker: David Bachman

Title: Mathematical Illustration with Artificial Intelligence

Abstract:
In this workshop we'll explore several ways in which AI tools can be of assistance with creating mathematical illustrations.