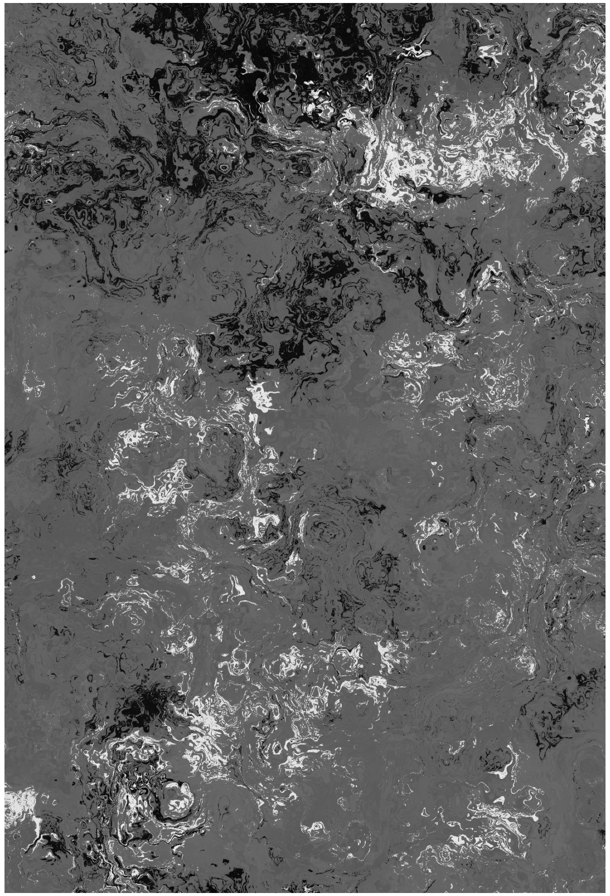
VECTORS GRAPHS AND PLOTS

Made By Ella Pash



DOMAIN WARPING

The inner front and back cover of this zine were created using domain warping, a technique that involves distorting or transforming the input space of a noise function, such as Perlin or Simplex noise. By warping the domain, artists and programmers can introduce dynamic patterns, intricate details, and organic irregularities into their digital landscapes. This process is akin to bending and stretching a canvas.

https://www.shadertoy.com/view/dttyD8

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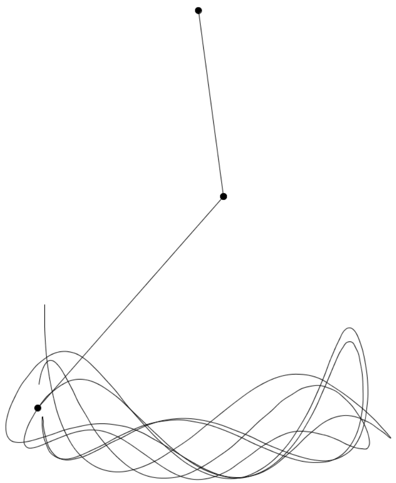

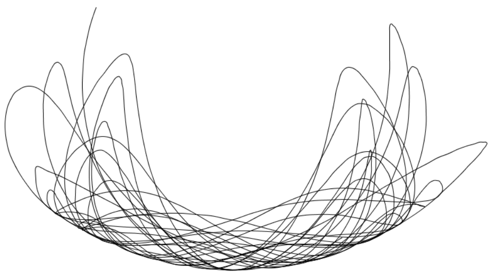

DOUBLE PENDULUMS

These pieces transform the chaotic movements of a double pendulum system into visually captivating designs. A double pendulum is a physical system with two pendulum arms linked together. As it swings and rotates, the complex interactions between the arms give rise to patterns that are both unpredictable and mesmerising. These motions are tracked and plotted onto a digital canvas, resulting in unique and ever-changing artworks that are a product of both physics and artistic expression.

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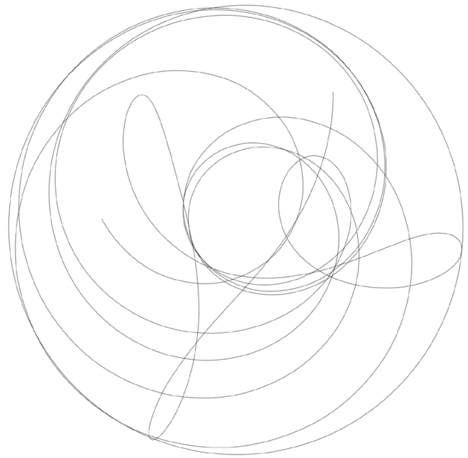

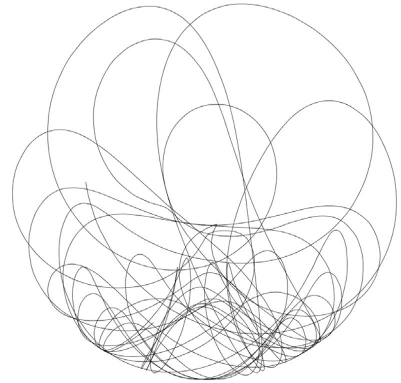

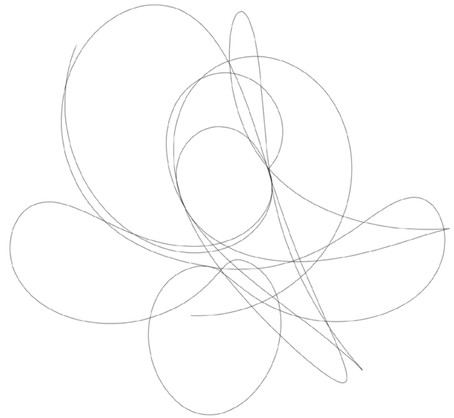

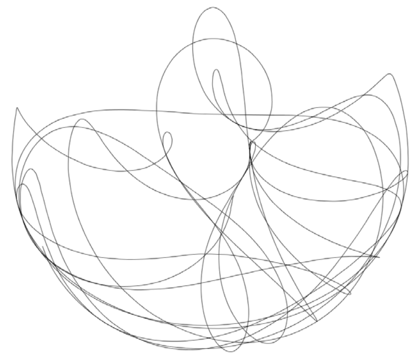

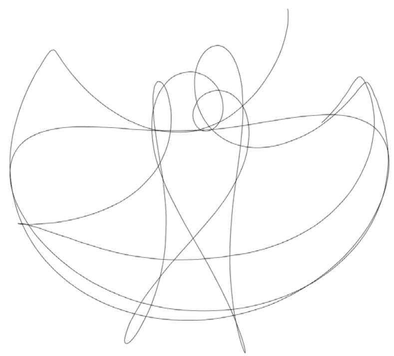

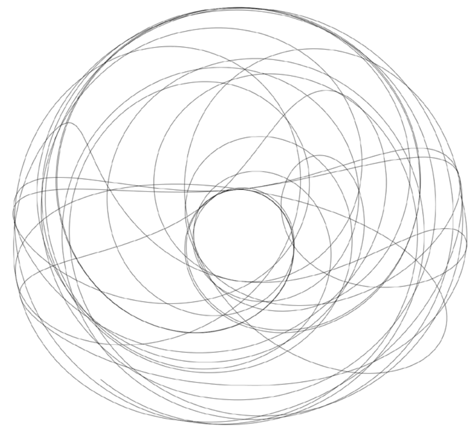

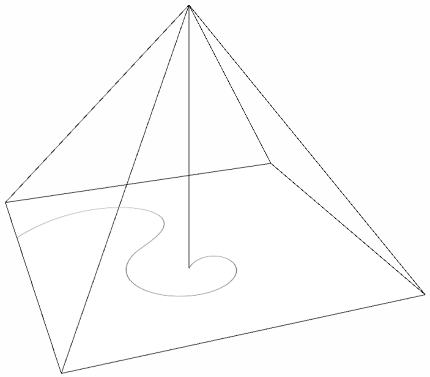

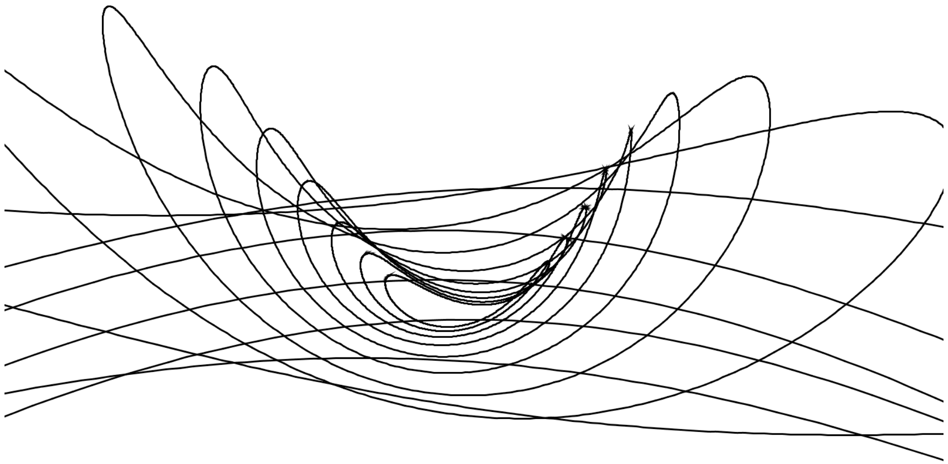

PENDULUM PAINTING

Drawing inspiration from pendulum painting, these generative art pieces embark on a creative journey through an approximate simulation of the physics governing a canvas swinging beneath a stream of ink. While not a meticulously detailed recreation, this simulation captures the essence of the canvas-ink interplay. The result is a stunning display of intricate, spiralling designs that unfold in a mesmerising dance, offering a unique fusion of scientific approximation and artistic expression.

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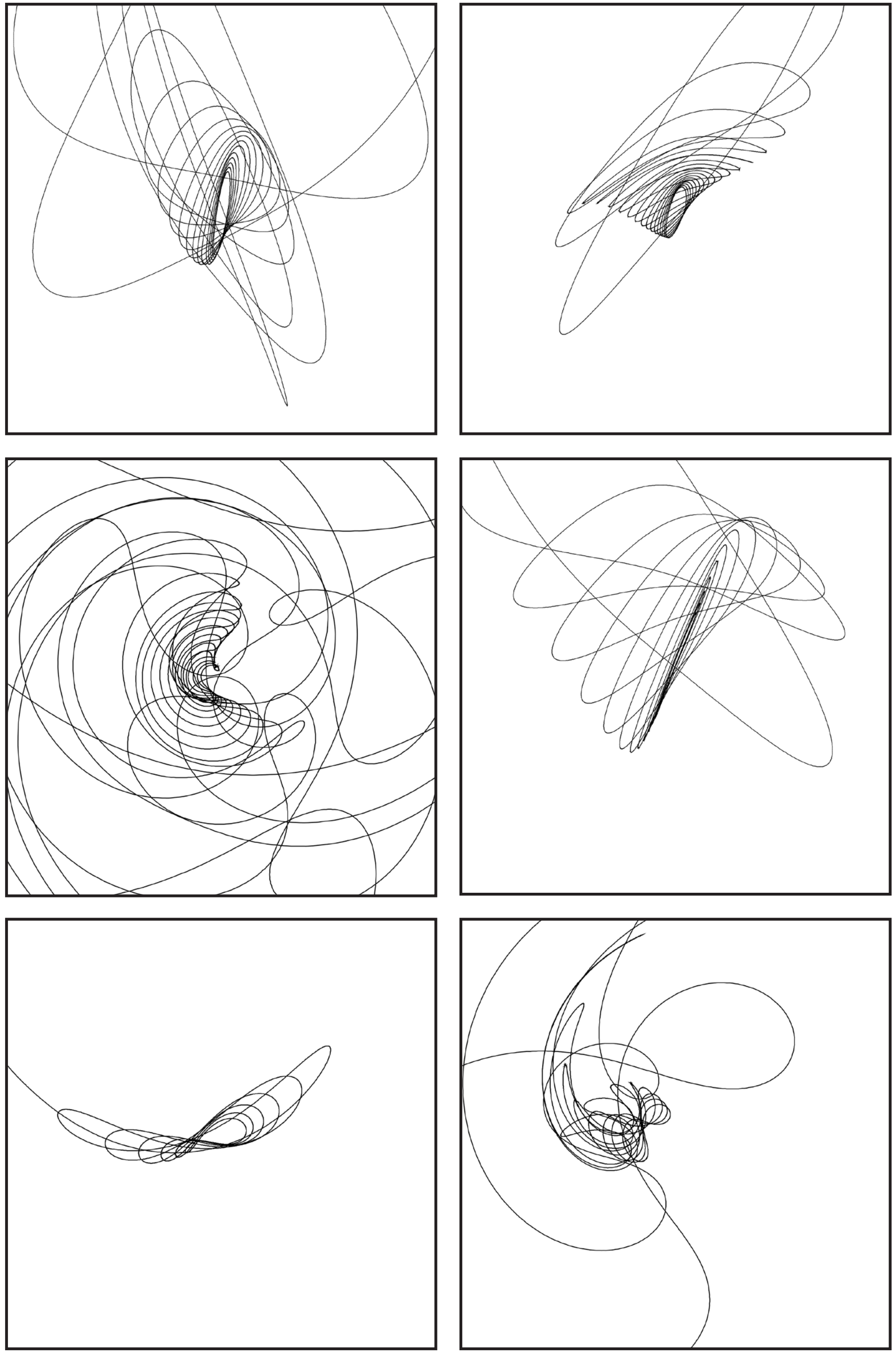

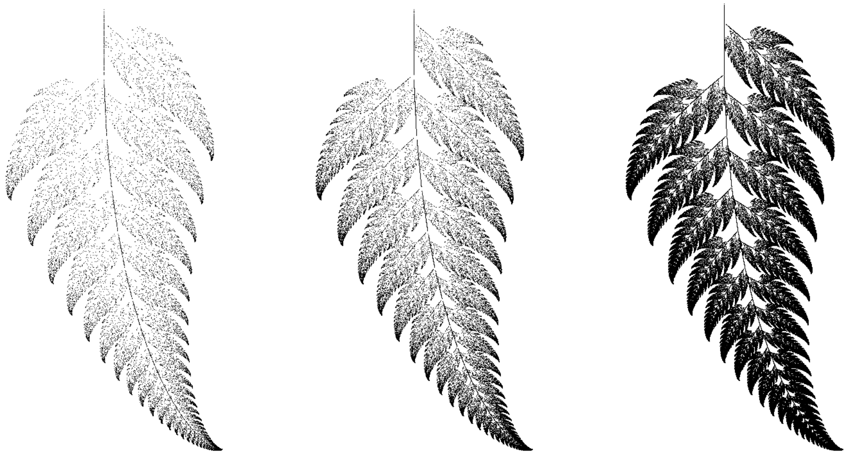

BARNSLEY FERN

The Barnsley Fern fractal utilises a mathematical algorithm to create a self-replicating pattern resembling a fern leaf. Fractals are characterised by self-similarity, meaning that as you zoom in on different parts of the fern, you'll find smaller copies of the overall fern shape, each with a similar structure to the whole. Named in honour of its creator, British mathematician Michael Barnsley, this particular fractal employs an iterative system rooted in affine transformations. Its delicate, leafy structure gradually unfolds as the algorithm runs its course, originating from a single point and expanding into a lush and intricate pattern. With each iteration, the fern gains more intricacy, creating a self-replicating and ever-evolving artwork.

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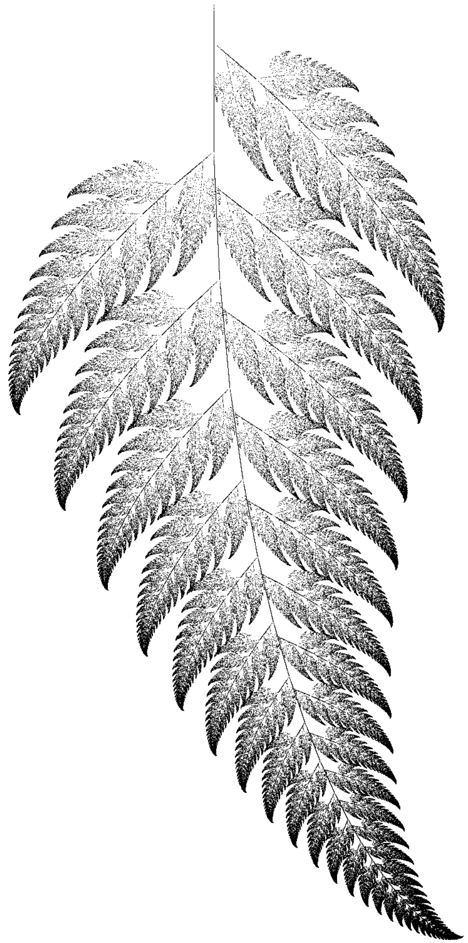
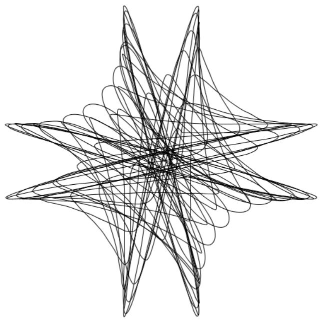
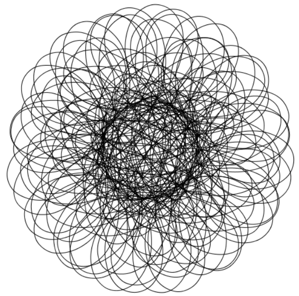


$$f(x,y) = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} e \\ f \end{bmatrix}$$



$$x(t) = \cos(t) + \sin(t) \cdot \cos\left(\frac{t}{10 \cdot \pi}\right)^3 \cdot 4$$
$$y(t) = \sin(t) + \cos(t) \cdot \sin\left(\frac{t}{10 \cdot \pi}\right)^3 \cdot 4$$



$$x(t) = \cos(t \cdot \pi) + \sin(t) + \cos\left(\frac{t}{10}\right)$$
$$y(t) = \sin(t \cdot \pi) + \cos(t) + \sin\left(\frac{t}{10}\right)$$

PARAMETRIC EQUATIONS

Generative art pieces that harness the power of parametric equations offer a fascinating journey through the intersection of mathematics and creativity. Parametric equations allow artists to define precise mathematical relationships between variables, which are then meticulously plotted onto the digital canvas. In this process, intricate and dynamic patterns emerge as mathematical expressions come to life, often with striking precision and complexity. Each generative artwork, born from the careful orchestration of these equations, represents a unique blend of scientific rigour and artistic intuition, showcasing the endless possibilities when mathematical precision meets the realm of digital creativity.

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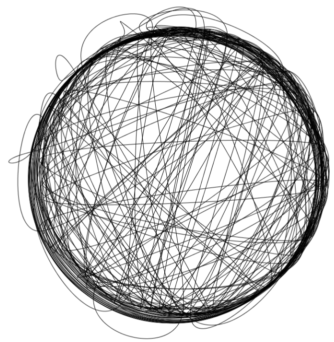
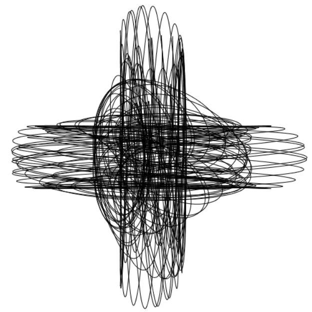
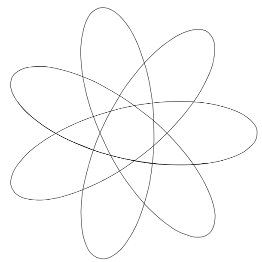
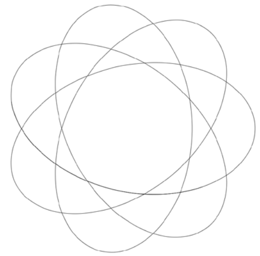


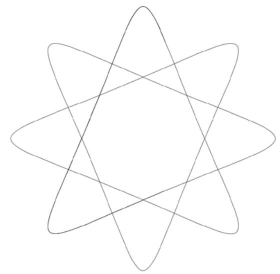
$$x(t) = \sin(5t)^2 \cdot \cos(t) + 10 \cdot cos\left(\frac{100}{t}\right)$$
$$y(t) = \cos(5t)^2 \cdot \sin(t) + 10 \cdot sin\left(\frac{100}{t}\right)$$



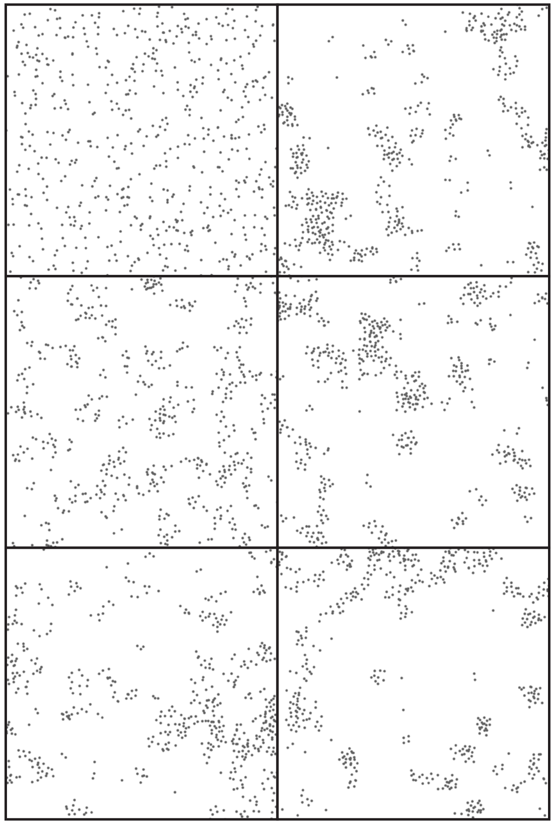
$$x(t) = \cos(t) + \sin(t \cdot \pi) \cdot cos\left(\frac{t}{10}\right)^3 \cdot 4$$
$$y(t) = \sin(t) + \cos(t \cdot \pi) \cdot sin\left(\frac{t}{10}\right)^3 \cdot 4$$







$$x(\theta) = (R - r)\cos\theta + d\cos\left(\frac{R - r}{r}\theta\right)$$
$$y(\theta) = (R - r)\sin\theta - d\sin\left(\frac{R - r}{r}\theta\right)$$



BOIDS AND CLUSTERING

Boids, a term derived from “bird-oid objects,” are algorithms used to simulate the behaviour of flocks or swarms, such as birds or fish. These algorithms define rules that govern the individual entities’ movement, leading to collective patterns that mirror the mesmerising formations found in nature. As these virtual entities interact and follow their set rules, they naturally form clusters or patterns, akin to the way birds flock or fish school in nature. These clusters can also be visualised becoming their own emergent entities defined by the movements and decisions of boids.

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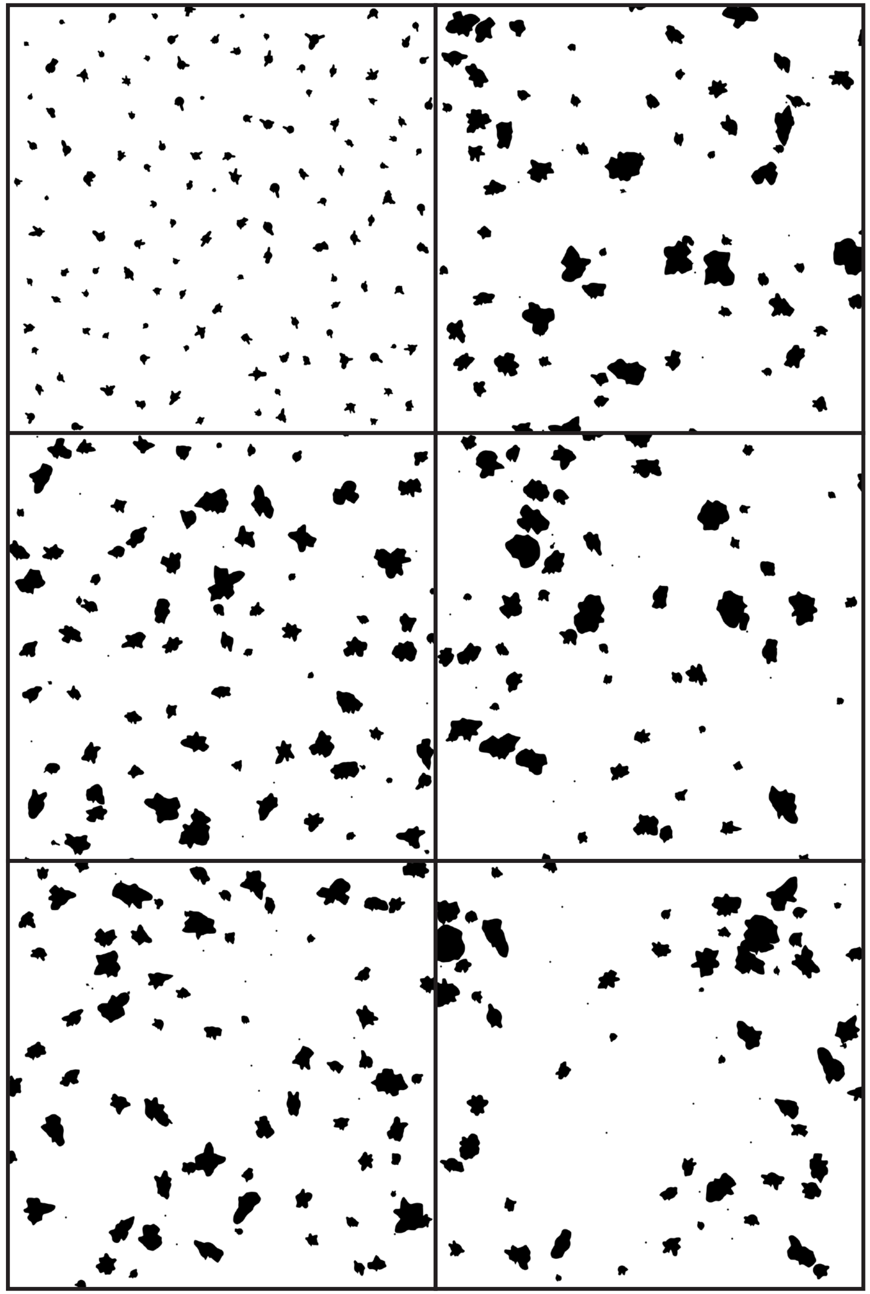

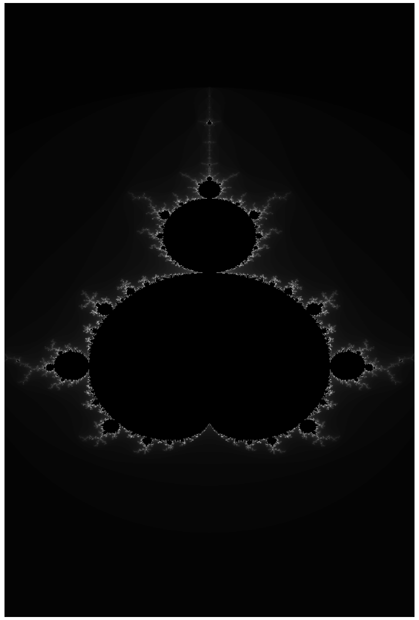

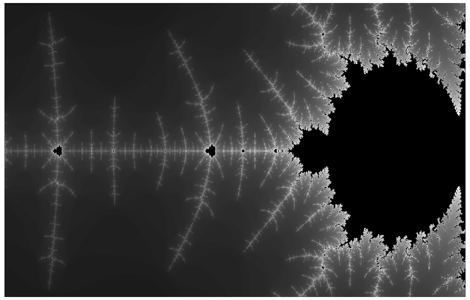

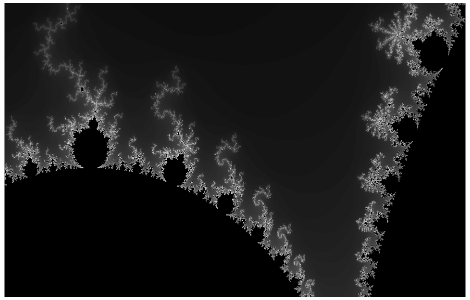

MANDELBROT SET

The Mandelbrot set, a fundamental fractal, is generated through an iterative process using a seemingly simple mathematical formula applied to complex numbers. This process evaluates each point on the complex plane to determine whether it remains within predefined boundaries or diverges into infinity, which in turn defines the point's colour or shading. Despite the formula's apparent simplicity, the Mandelbrot set reveals intricate self-similar patterns and concealed complexities. Artists who delve into this fractal discover an ever-expanding canvas of beauty and intricacy, offering them endless possibilities to create captivating and ever-evolving visual compositions.

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