A tour of the Mandelbrot set

# What we know

Definition: iteration of with *z* being 0 and *c* being a complex number

The coloured part (shape) of the Mandelbrot set is whenever for some constant *c* in the function, the function does not reach more than 2

Baby Mandelbrot sets: same *approximate* shape inside the Mandelbrot set

The Mandelbrot set is a fractal

Definition 2.0: filled Julia set

* Mathematical chaos: small init changes leading to significant changes in the long term
* Chaotic points: points for which the neighbour points cause significant changes in outcome (as a boundary)
* *c* is in the M set if the filled Julia set for forms one shape

Parts of M set:

* Main cardioid
* Rabbit component (top)
  + **All of the components** look like a rabbit (normal, fat, skinny (and twisted)) in Julia set
  + Every connection point has 3 sides
    - Tracking the iteration of 0 forms a shape with 3 sides
  + Period of component: 3
* Airplane component
* Corabbit component

The Fibonacci sequence is inside the Mandelbrot set (also the Golden Spiral)

The **number** of a component is the same as the **denominator** of the angle that leads to it

Mediant (freshman sum):

The M set carries info of infinitely many different filled Julia sets (seen once zoomed in)

Is the Mandelbrot set self-similar?

* **NO,** because of the representation of filled Julia sets
* It is quasi-self-similar

Reciprocal: n to

The Mandelbrot set is **universal**. Universality: as long as it’s an iterative system, the M set will be visible there.

# What we don’t know

Density of hyperbolicity conjecture: Can all components be assigned a number (period no.)?

What do some special Julia sets look like?

* Feigenbaum point: the point where the infinite reiteration stops. What does the Julia set for it look like? Approximate
  + Real. Transcendental - ???

Area:

* What kind of number is the area?

What happens to iterations in other number systems?