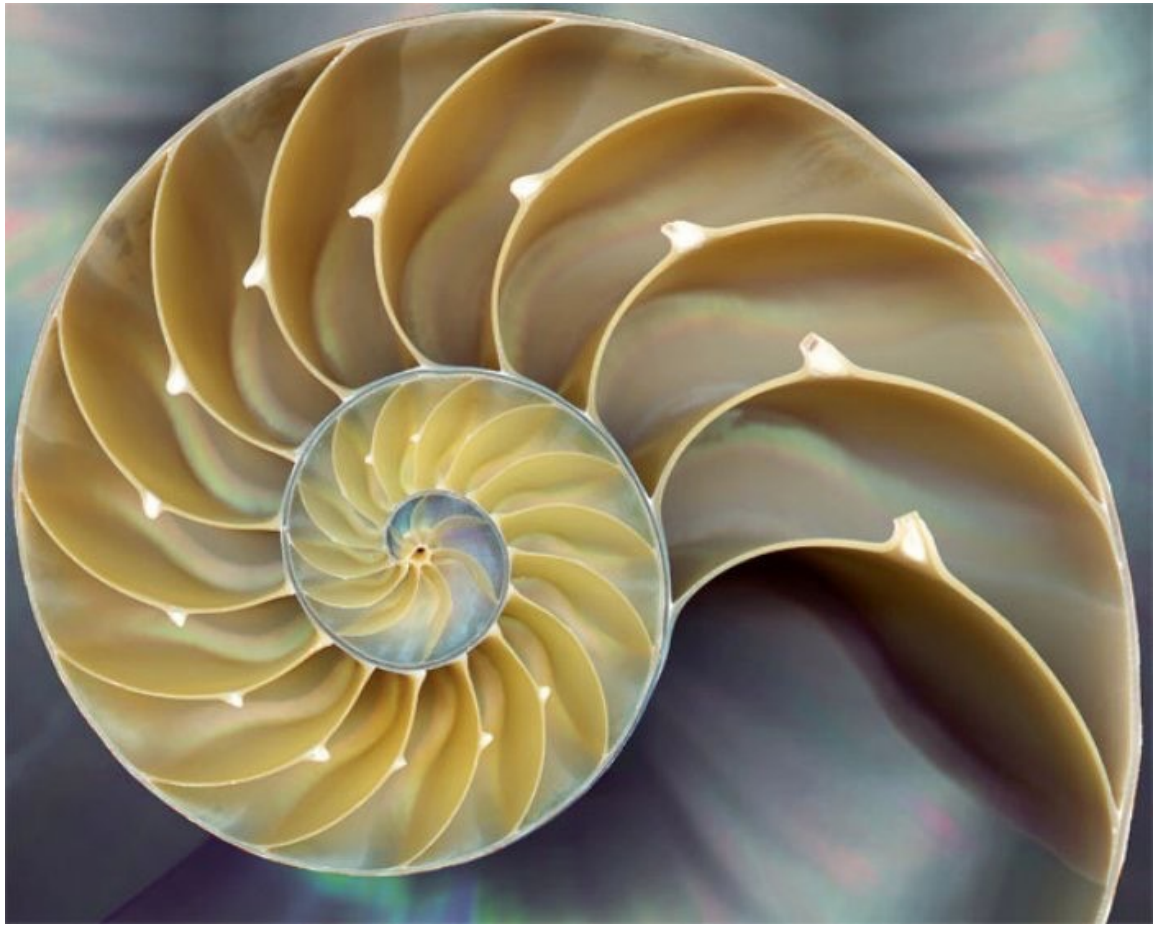
Fibonacci Sequence and Spirals



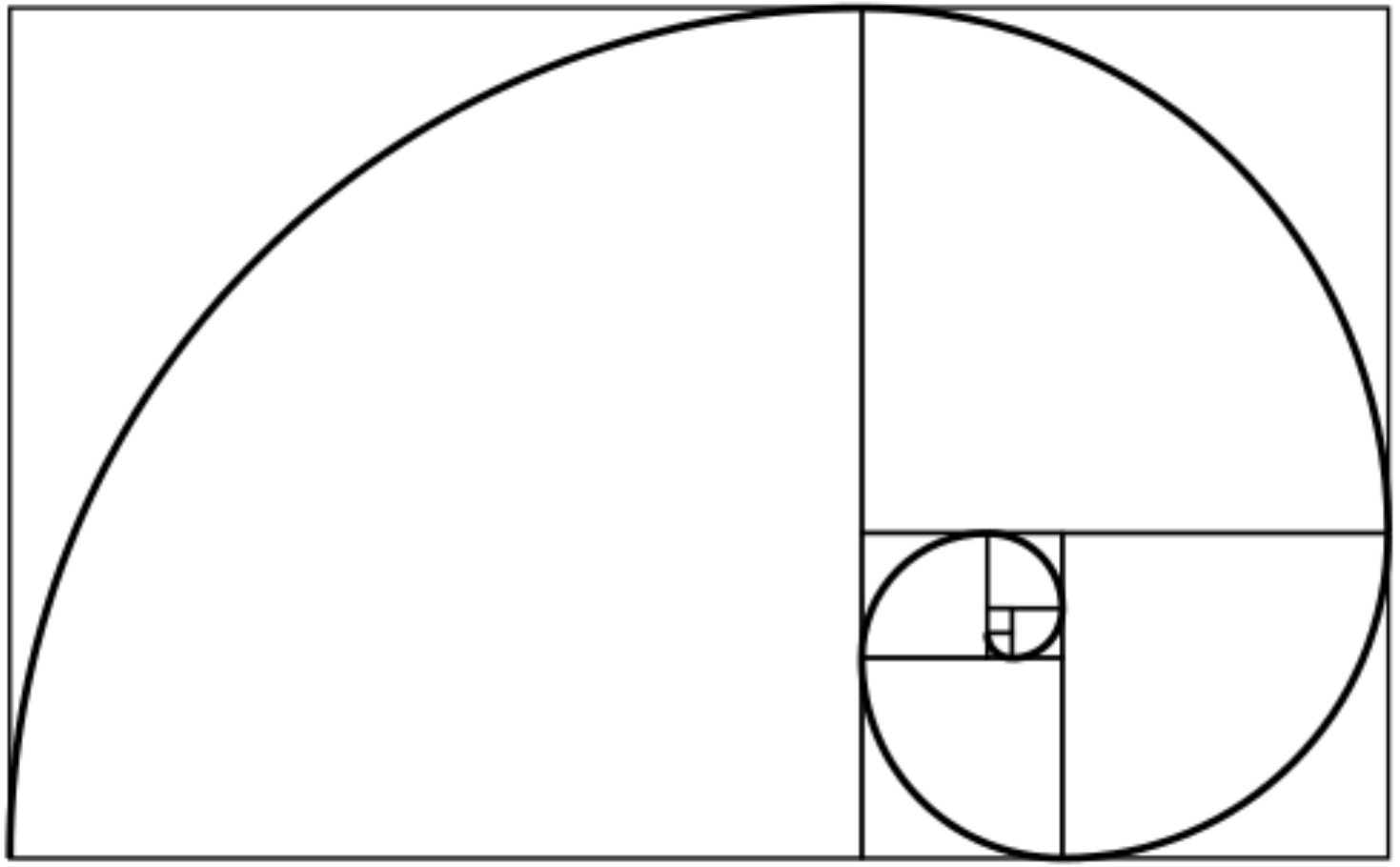
- Fibonacci, or Leonardo of Pisa, was a mathematician at the turn of the twelfth century.
- He was studying the rate at which rabbits breed and applied this sequence to it, he then discovered that this formula is true of the way many natural things expand, and frequently results in a spiral formation.

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 377, 610 and so on

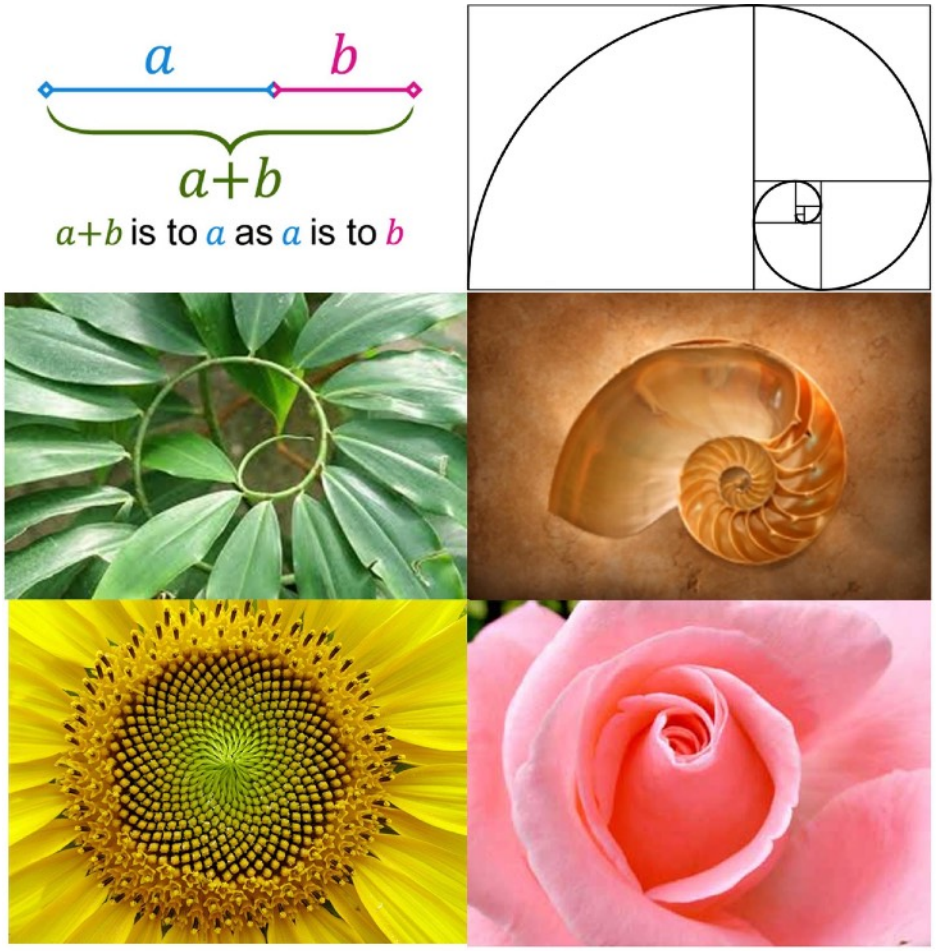
- Each sequential number is the sum of the previous two.
- 0 + 1 = 1, 1 + 1 = 2, 1 + 2 = 3, 2 + 3 = 5, 3 + 5 = 8, 5 + 8 = 13, 8 + 13 = 21, 13 + 21 =34
- If each number is divided by the number before it, 8/5 = 1.6, the answer is consistent within a small tolerance.
- If each number is divided by the number after it, 5/8 = 0.625 the ratio is inversed.
- This is called the Golden Ratio

Typically a sunflower will have 34 clockwise spirals and 55 anti clockwise

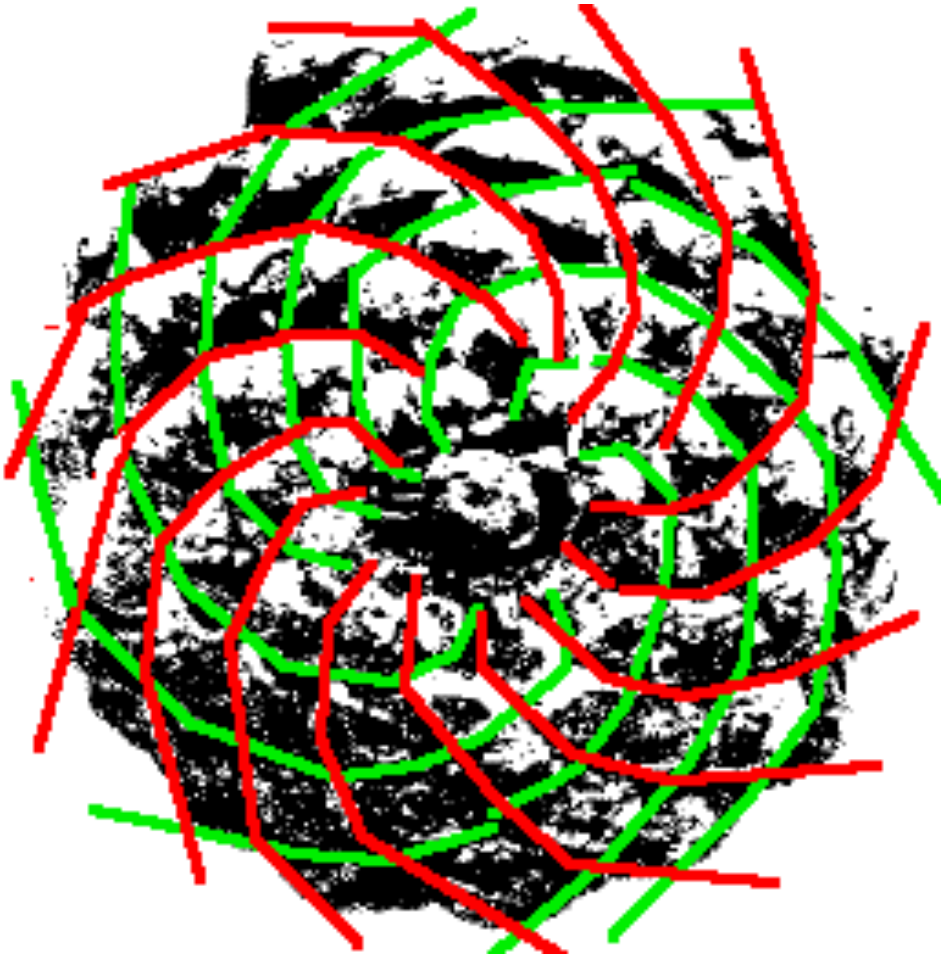
The Logarithmic Spiral

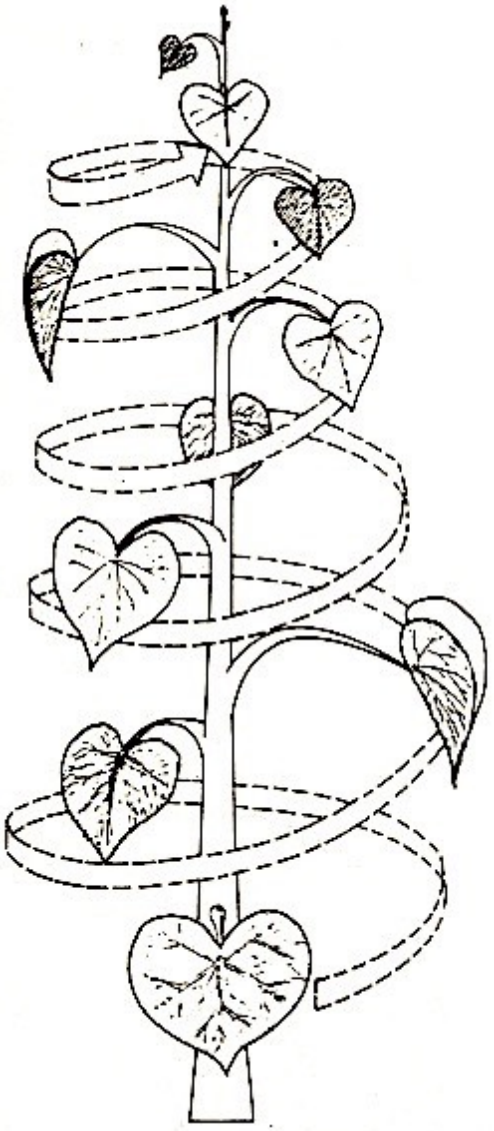


Examples of this spiral found in nature.



Pinecone spirals





But…

- Many plants do not use the Fibonacci sequence. Ferns branch using fractal pattern growth, maize seeds grow in rows.
- When drawing from life the spirals and patterns are often hidden, the plant is at an interesting angle, the plant may have deviations and parts where it is unclear.

Fractal Pattern in Ferns