Fibbonacci Series

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Fibonacci

The Fibonacci sequence: named after Leonardo of Pisa, who was known as Fibonacci.
Fibonacci's 1202 book Liber Abaci introduced the sequence to Western European mathematics.
(By modern convention, the sequence begins with F0 = 0. The Liber Abaci began the sequence with F1 = 1)
Fibonacci considers the growth of an idealized (biologically unrealistic) rabbit population, assuming that: a newly born pair of rabbits, one male, one female, are put in a field; rabbits are able to mate at the age of one month so that at the end of its second month a female can produce another pair of rabbits; rabbits never die and a mating pair always produces one new pair (one male, one female) every month from the second month on. The puzzle that Fibonacci posed was: how many pairs will there be in one year?

Fibonacci

- At the end of the first month, they mate, but there is still only 1 pair.
- At the end of the second month the female produces a new pair, so now there are 2 pairs of rabbits in the field.
- At the end of the third month, the original female produces a second pair, making 3 pairs in all in the field.
- At the end of the fourth month, the original female has produced yet another new pair, the female born two months ago produces her first pair also, making 5 pairs.
- At the end of the nth month, the number of pairs of rabbits is equal to the number of new pairs (which is the number of pairs in month $n - 2$) plus the number of pairs alive last month $(n - 1)$. This is the nth Fibonacci number.

Mātrā Vṛttas

Ācārya Virahāṅka gave the rule for formation of numbers of variations in mātrā vṛttas for the first time.
Gopāla discusses Virahāṅka's rule in detail as follows
Variations of two earlier meters [is the variation] is a mātrā-vṛtta.

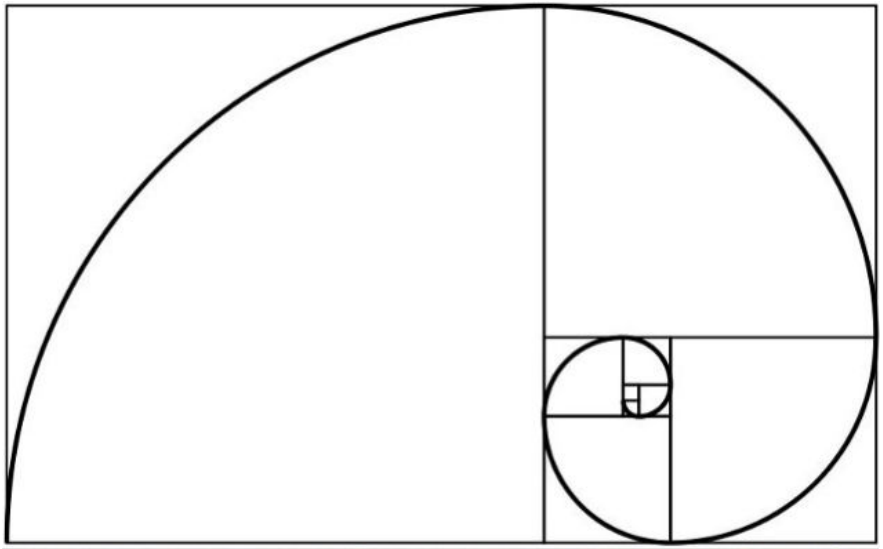
Mātrā Vṛttas

- For [a meter of] three [morae], variations of two earlier meters, one and two, being mixed three happens.
- For [a meter] of four [morae], variations of meters of two morae [and] of three moare being mixed, five happens.
- For [a meter] of five [morae], variations of meters of two earlier [meters] of three morae [and] of four morae, being mixed, eight is obtained.
- In this way, for [a meter] of six morae, [variations] of four morae [and] of five morae being mixed, thirteen happens. And like that, variations of two earlier meters being mixed, [variations of a meter] of seven morae [is] twenty-one.
- In this way, the process shuould be followed in all mātrā-vṛttas.

Mātrā Vṛttas

- A meter of 3 mātrās = A meter of 1 mātrā + G
  = A meter of 2 mātrā + L
  S[3] = S[1] + S[2]
- A meter of 4 mātrās = A meter of 2 mātrā + G
  = A meter of 3 mātrā + L
  S[4] = S[2] + S[3]
- A meter of 5 mātrās = A meter of 3 mātrā + G
  = A meter of 4 mātrā + L
  S[5] = S[3] + S[4]

Fibonacci Sequence in Nature



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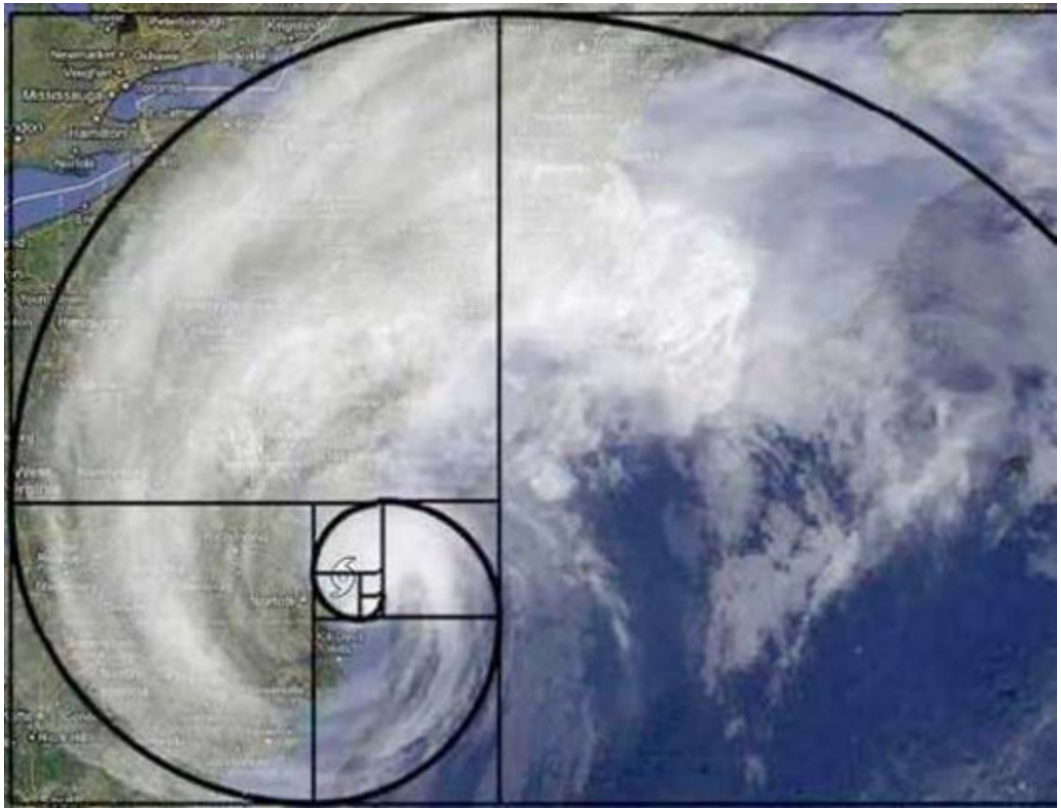

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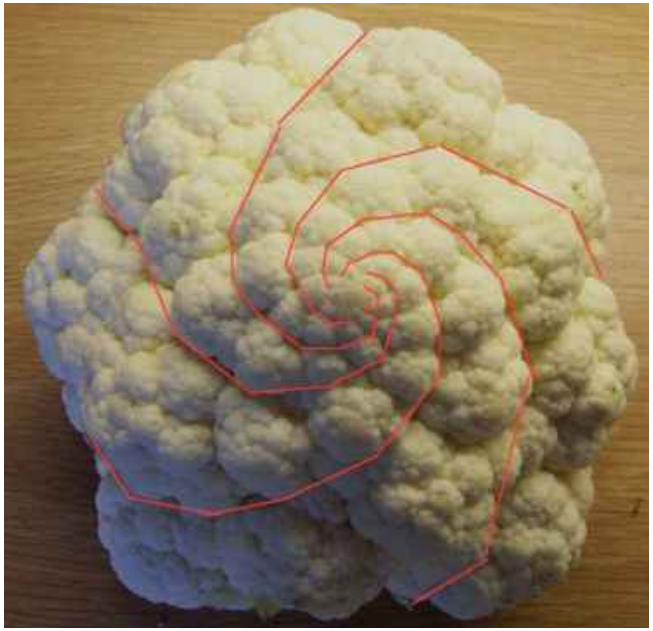
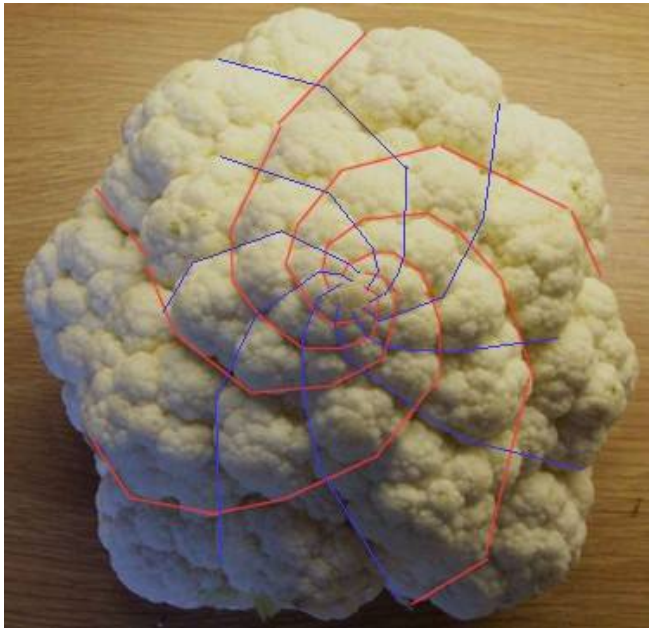
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