Fibonacci Sequence

0, 1, 1, 2, 3, 5, ___, ___, ___, ___, ___, ...

Objectives

- Complete a Fibonacci sequence on paper
- Make a logarithmic spiral (a “Golden Spiral”)
- Python program that prints out the Fibonacci Sequence

Leonardo Pisano a.k.a. Fibonacci

- 1170 - 1250
- Italian mathematician
- Created the Fibonacci Sequence

0, 1, 1, 2, ___, ___, ___, ___, ...

Write these numbers down on a sheet of paper.

What number comes next?

Do you see the pattern?

Add the following numbers on your sheet of paper

0, 1, 1, 2, 3, 5, 8, 13, 21,

- The first two items are 0 and 1
- We obtain the other items by adding the preceding items:

$0 + 1 = 1$

$1 + 1 = 2$

$1 + 2 = 3$

$2 + 3 = 5$

$3 + 5 = 8$

$5 + 8 = 13$

$8 + 13 = 21$

And on, and on, infinitely!

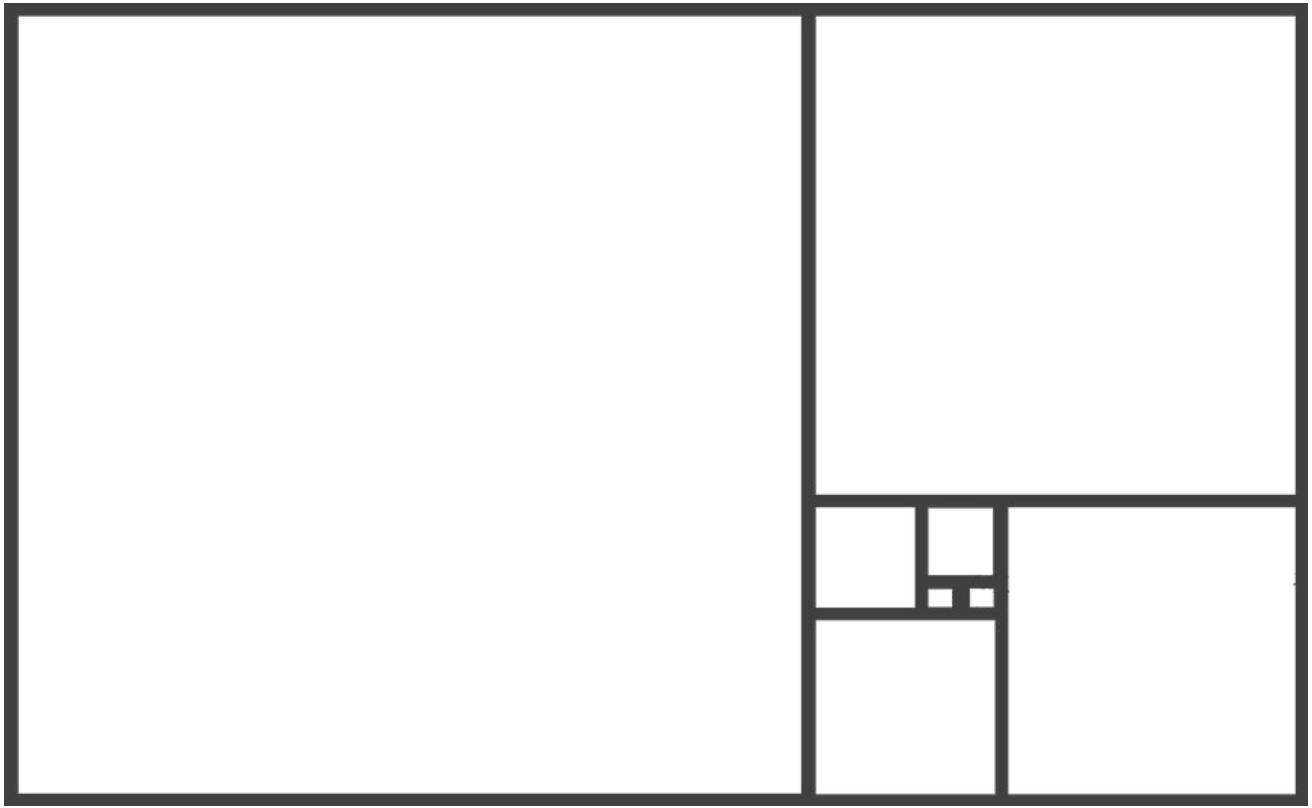
We can use this sequence of integers to draw a logarithmic spiral (a.k.a. Golden Spiral)

Logarithmic Spiral Instructions

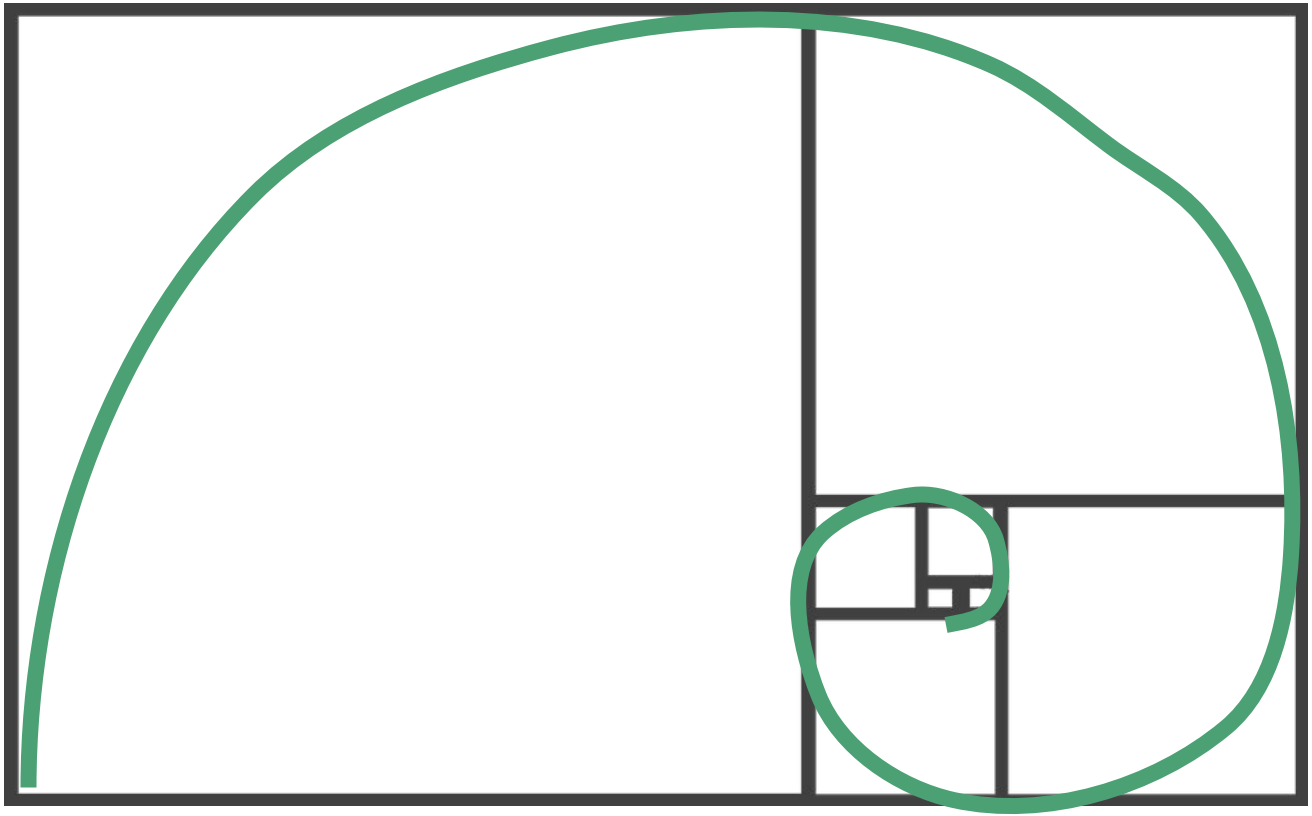
1. Draw two squares side by side. Use your ruler to make them 0.5 cm square
2. Now make a 2 × 2 square on top of the first square. So if the first square was 0.5 cm, the 2 × 2 square would be 1 cm square, right?
3. Continue this pattern, making each square the next size in the Fibonacci sequence.

So after the 2 × 2 square, you would make a 3 × 3 square (1.5 cm × 1.5 cm), then a 5 × 5 (2.5 cm × 2.5 cm), and so on

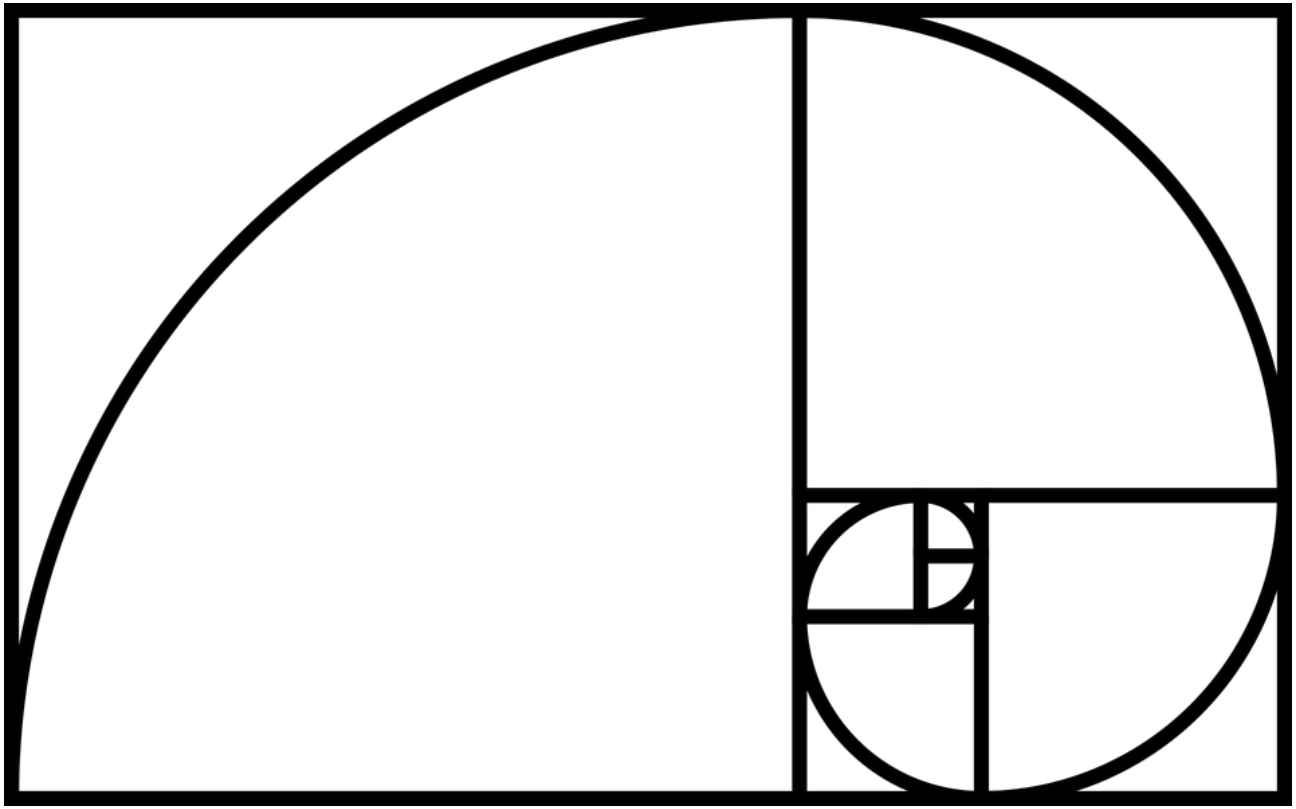
You should end up with something like this...



To visualize our Logarithmic Spiral...



Logarithmic Spiral



Have you seen this spiral before?

-YES

Can Be Found in Nature.
... All around us!
Have you ever pulled the petals off of a daisy?

Staircases

Snails

Inside of a Nautilus Shell


Fibonacci
8
5
1
1
3
2

Python Program to Print the Fibonacci Sequence

Prereques

- Python lists
- For loop

How the Program Needs to Perform

- We need the program to ask the user for input on how many fibonacci numbers they want to display.
- We need to set up a starting list.
- Then we need to have the program add the two preceding numbers to get the next number in the sequence, add that number to the list.
- Then, repeat that operation, however many times the user specified.

Make a new file named fibonacci.py

What do we need for the program?

- A Python `list`
- A Python `for` loop

fibonacci.py

Variable to get how many fibonacci numbers the user want to display:

```
howMany = int(raw_input("How many numbers should I create?"))
```

Our starting list:

```
nums = [1, 1]

print(1)

print(1)
```

```
for i in range(2, howMany):
    nextFib = nums[-1] + nums[-2]
    nums.append(nextFib)
    print(nextFib)
```