

# Python Fred's Fibonacci Sequence Formulator

Time required: 90 minutes

- Comment each line of code as shown in the tutorials and other code examples.
- Follow all directions carefully and accurately.
- Think of the directions as minimum requirements.

## Pseudocode

1. Write pseudocode or TODO for the exercise
2. Submit with the assignment

## Scenario

A couple of videos to help you understand the Fibonacci Sequence

1. [What is the Fibonacci Sequence?](#) (How to calculate)
2. [The Fibonacci Sequence](#) (How to calculate)
3. [What is the Fibonacci Sequence & the Golden Ratio?](#)
4. [The magic of Fibonacci numbers | Arthur Benjamin | TED](#)

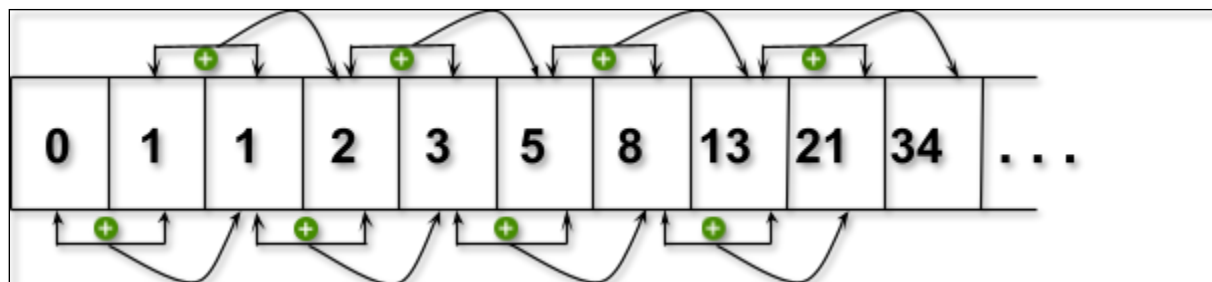
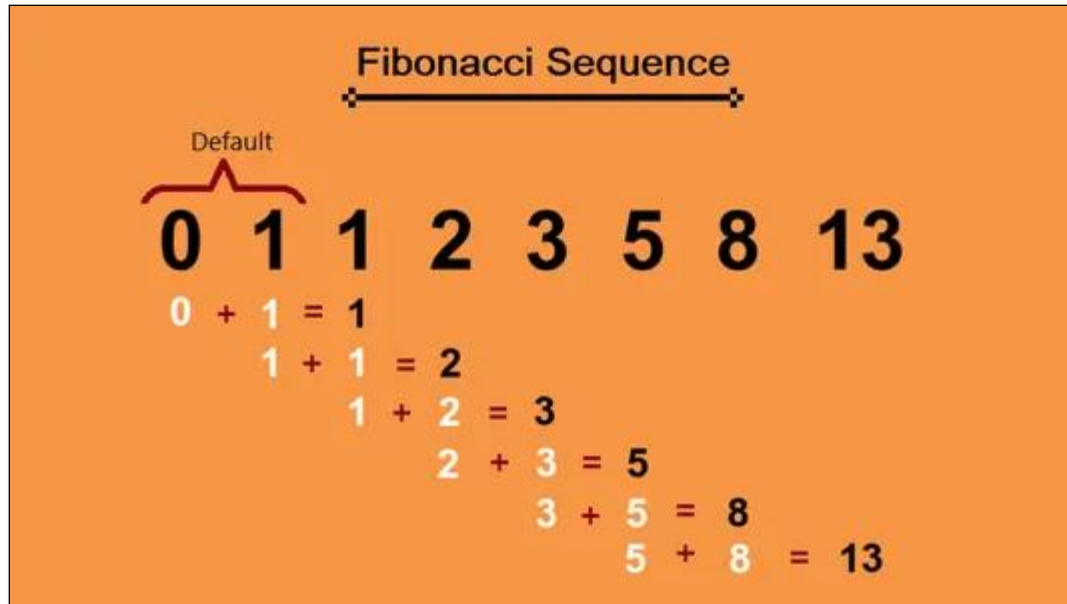
The Fibonacci Sequence is a sequence of numbers in which a given number is the result of adding the 2 numbers that come before it. Adding the previous 2 numbers some number of times forms a series that we call the Fibonacci Series.

The Fibonacci sequence starts with two numbers, that is 0 and 1. Every following number is made up of adding the previous two numbers together.

For example, take 0 and 1. They're the first two numbers in the sequence. If you add them together, you get 1. So the sequence starts 0, 1, 1,...

To find the next number, you add the last number you have and the number before it. So  $1+1 = 2$ . So the sequence so far is 0, 1, 1, 2, ... Make sense?

We can represent this more mathematically like 0, 1, (1) -  $[0 + 1]$ . Similarly, the next Fibonacci number is - 0, 1, 1, (2) -  $[1 + 1]$ . And so on. Here's a diagram showing the first 10 Fibonacci numbers:



This is an example of a Fibonacci series – 0, 1, 1, 2, 3, 5, 8, 13, 21, 34. Within this continuous sequence, every individual number is a Fibonacci number.

Mathematically, the Fibonacci Sequence is represented by this formula:

$$F(n) = F(n-1) + F(n-2), \text{ where } n > 1.$$

We can use this sequence to find any nth Fibonacci number.

This fascinating sequence is widely associated with the mathematician Leonardo Pisano, also known as Fibonacci. He was from the Republic of Pisa, which is why he is also known as Leonardo of Pisa. Leonardo was known as one of the most talented mathematicians of the middle ages.

## The Algorithm

Get out a pencil and paper. Calculate the Fibonacci sequence by hand.

Take a photo of your work and attach to this assignment.

## Requirements

You can use functions or OOP.

1. Create a program in Python named **fred\_fibonacci.py**
2. Create a function to calculate the Fibonacci sequence of any number, and return the value.
  - a. This function or method will take in an integer as an argument.
  - b. The method will calculate the sequence.
  - c. The result will be returned to the main application.
3. Input will take place in the main application.
4. Display will take place in the main application.
5. Ask the user to enter a natural number.
6. Calculate the Fibonacci sequence.
7. Display the input and output as shown.
8. Ask the user if they wish to continue or exit.

Example runs:

```
+-----+
|           Fred's Fibonacci Sequence Formulator           |
+-----+
Enter the number of Fibonacci numbers to be printed: 10
0 1 1 2 3 5 8 13 21 34
```

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## Assignment Submission

1. Take a photo of your manual calculation of the Fibonacci sequence and attach to this assignment.
2. Attach the pseudocode.
3. Attach the program files.
4. Attach screenshots showing the successful operation of the program.
5. Submit in Blackboard.