# Fibonacci Numbers

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This is a python programme to fill an array with the first 20 Fibonacci numbers using a for-loop. This information is then displayed on a semi-log graph of the numbers versus their place in the sequence.

In this case, we define the Fibonacci numbers to be a sequence of integers starting with 1, 1 and continuing with each subsequent element being the addition of the previous two elements.

Using this information, we can describe each element mathematically using the formula:

$$F_n = F_{n-1} + F_{n-2}$$

- Calculate the Fibonacci numbers with the use of the formula above
- Initialise the first two Fibonacci numbers
- Enter the loop to generate the remaining Fibonacci numbers
- Output a list of the Fibonacci numbers
- Output a semi-log graph of the Fibonacci numbers versus their place in the sequence

In [150…

```
# Numpy is needed for our calculations
import numpy as np

# Create an array to store Fibonacci numbers
Fn = np.zeros(21)

# Initialise the first two elements of the array:
Fn[0] = 1 # First Fibonacci number
Fn[1] = 1 # Second Fibonacci number

# For-loop to calculate Fibonacci number as sum of two previous numbers and print the first 20 Fibonacci numbers
for n in range (1, 21):
```

```
    Fn[n] = Fn[n - 1] + Fn[n - 2]
    print("#", n, "Fibonacci number = ", Fn[n - 1])
```

```
# 1 Fibonacci number =  1.0
# 2 Fibonacci number =  1.0
# 3 Fibonacci number =  2.0
# 4 Fibonacci number =  3.0
# 5 Fibonacci number =  5.0
# 6 Fibonacci number =  8.0
# 7 Fibonacci number =  13.0
# 8 Fibonacci number =  21.0
# 9 Fibonacci number =  34.0
# 10 Fibonacci number =  55.0
# 11 Fibonacci number =  89.0
# 12 Fibonacci number =  144.0
# 13 Fibonacci number =  233.0
# 14 Fibonacci number =  377.0
# 15 Fibonacci number =  610.0
# 16 Fibonacci number =  987.0
# 17 Fibonacci number =  1597.0
# 18 Fibonacci number =  2584.0
# 19 Fibonacci number =  4181.0
# 20 Fibonacci number =  6765.0
```

In [155…

```
# Matplotlib is needed to plot a semi-log graph
import matplotlib.pyplot as plt
%matplotlib inline

# plot the semi-log graph of the Fibonacci numbers versus their place in the sequence
X = (Fn)
Y = np.linspace(0, 20, 21)

# Create graph, where x values are the array of the first twenty fibonacci number and Y values are there place in the s
plt.semilogy(X, Y)

# Title Graph
plt.title("Semi-log graph of the Fibonacci numbers versus their place in the sequence:")

# Label X and Y axis
plt.xlabel("Nth Term")
plt.ylabel("Fibonacci Number")

# Add grid lines
plt.grid(which = 'both')
```

```
# Print Graph
plt.show()
```

Semi-log graph of the Fibonacci numbers versus their place in the sequence: