Problem25

April 6, 2022

1 Problem 25

The Fibonacci sequence is defined by the recurrence relation:

`Fn = Fn-1 + Fn-2, where F1 = 1 and F2 = 1.`

Hence the first 12 terms will be:

```
F1 = 1
F2 = 1
F3 = 2
F4 = 3
F5 = 5
F6 = 8
F7 = 13
F8 = 21
F9 = 34
F10 = 55
F11 = 89
F12 = 144
```

The 12th term, F12, is the first term to contain three digits.

What is the index of the first term in the Fibonacci sequence to contain 1000 digits?

[ ]:
```
digit_count = 1 #number of digits
f = f_minus_1 = 1  #The current decimals of the series in the range 0 < f < 10
max_digits = 1000
index = 2  #position in sequence
```

One function to generate sequence, keeping the decimals below 10 and incrementing the digits when the number goes above 10

[ ]:
```
while digit_count < max_digits:
    new_f = f + f_minus_1
    if new_f >= 10:
        new_f = new_f / 10
        f = f / 10
        digit_count = digit_count + 1
    f_minus_1 = f
    f = new_f
```

```
    index = index + 1

print("index = ", index, "  f = ", f, "  digits = ", digit_count)
```

```
index =  4782   f =  1.0700662663827594   digits =  1000
```

Gives the correct answer of *4782*