

project euler 0002

June 12, 2023

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Final result : 4613732

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[48]: # using the Binet formula, we first define the constants used in the
# functionnal definition of the fibonacci sequence
a = (1 + sqrt(5)) / 2
b = (1 - sqrt(5)) / 2
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[49]: # We then define a function of n following the Binet formula ...
n = var('n')
F(n) = (1/sqrt(5)) * (a^n - b^n)
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[52]: # ... and we loop over each value of F
# adding only the even values to the final result
# and correcting the computation error by rounding the result
N = NonNegativeIntegers()
result = 0

for i in N:
    fibonacci = F(i).round()
    if fibonacci > 4000000:
        break
    if fibonacci % 2 == 0:
        result = result + fibonacci
```

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[51]: show(result)
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4613732