

# 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)
```

4613732