

Project Euler Solutions Document

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1 Multiples of 3 and 5

Problem: If we list all the natural numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23. Find the sum of all the multiples of 3 or 5 below 1000.

Answer: 233498

Method: Three counters from 1 to n . The first, i , counting normally and the second two modulo 3 and 5. When the modulo counts reset, i is added to the sum. An if statement stops i being added twice if the modulo counters both reset, for example at $i = 15$.

2 Even Fibonacci numbers

Problem: 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:

$$1, 2, 3, 5, 8, 13, 21, 34, 55, 89, \dots$$

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

Answer: 5702886

Method: Rather than check parity of each entry, notice that every third term is even. A modulo three counter moves as the sequence is generated and added every third (and hence even) term. The Fibonacci sequence is generated as normal.

3 Largest Prime Factor

Problem: The prime factors of 13195 are 5, 7, 13 and 29. What is the largest prime factor of the number 600851475143 ?

Answer: ?

Method: My current solution doesn't work on such large numbers, currently rewriting the problem.

4 Largest Palindrome Product

Problem: A palindromic number reads the same both ways. The largest palindrome made from the product of two 2-digit numbers is $9009 = 91 \times 99$. Find the largest palindrome made from the product of two 3-digit numbers.

Answer: 90909

Method: My current solution is correct but very inefficient.