

Object-Oriented Programming Using C++

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Programming Questions

1. 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 : 233168**
2. 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. **Answer : 4613732**

3. The prime factors of 13195 are 5, 7, 13 and 29. What is the largest prime factor of the number 600851475143? **Answer : 6857**
4. A palindromic number reads the same both ways. The largest palindrome made from the product of two 2-digit numbers is 9009 = 91 × 99. Find the largest palindrome made from the product of two 3-digit numbers. **Answer : 906609**
5. 2520 is the smallest number that can be divided by each of the numbers from 1 to 10 without any remainder. What is the smallest positive number that is evenly divisible by all of the numbers from 1 to 20? **Answer : 232792560**
6. The sum of the squares of the first ten natural numbers is,

$$1^2 + 2^2 + \cdots + 10^2 = 385.$$

The square of the sum of the first ten natural numbers is,

$$(1 + 2 + \cdots + 10)^2 = 55^2 = 3025.$$

Hence the difference between the sum of the squares of the first ten natural numbers and the square of the sum is $3025 - 385 = 2640$. Find the difference between the sum of the squares of the first one hundred natural numbers and the square of the sum. **Answer : 25164150**

7. By listing the first six prime numbers: 2, 3, 5, 7, 11, and 13, we can see that the 6th prime is 13. What is the 10,001st prime number? **Answer : 104743**

8. A Pythagorean triplet is a set of three natural numbers, $a < b < c$, for which,

$$a^2 + b^2 = c^2.$$

For example, $3^2 + 4^2 = 9 + 16 = 25 = 5^2$. There exists exactly one Pythagorean triplet for which $a + b + c = 1000$. Find the product abc .

Answer : 31875000

9. The four adjacent digits in the 1000-digit number that have the greatest product are $9 \times 9 \times 8 \times 9 = 5832$. The 1000-digit number is:

73167176531330624919225119674426574742355349194934
 96983520312774506326239578318016984801869478851843
 85861560789112949495459501737958331952853208805511
 12540698747158523863050715693290963295227443043557
 66896648950445244523161731856403098711121722383113
 62229893423380308135336276614282806444486645238749
 30358907296290491560440772390713810515859307960866
 70172427121883998797908792274921901699720888093776
 65727333001053367881220235421809751254540594752243
 52584907711670556013604839586446706324415722155397
 53697817977846174064955149290862569321978468622482
 83972241375657056057490261407972968652414535100474
 82166370484403199890008895243450658541227588666881
 16427171479924442928230863465674813919123162824586
 17866458359124566529476545682848912883142607690042
 24219022671055626321111109370544217506941658960408
 07198403850962455444362981230987879927244284909188
 84580156166097919133875499200524063689912560717606
 05886116467109405077541002256983155200055935729725
 71636269561882670428252483600823257530420752963450

Find the thirteen adjacent digits in the 1000-digit number that have the greatest product. What is the value of this product? **Answer : 23514624000**

10. The sum of the primes below 10 is $2 + 3 + 5 + 7 = 17$. Find the sum of all the primes below two million. **Answer : 142913828922**