**Name:**

**Advanced Programming in C++**

**Challenging Problems**

**Lab Exercise 5.8.2025**

**These are challenging problems (at least the last two are). Everyone needs to be challenged, that is how you get good at programming. Submit your answers filled in at the bottom of this sheet, along with your source code.**

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.
2. Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 0 and 1, the first 12 terms will be:

0, 1, 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.

1. The prime factors of 13195 are 5, 7, 13 and 29. What is the largest prime factor of the number 600851475143 ?
2. 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.

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