**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Advanced Programming in C++**

**Lab Exercise 5.22.2023**

1. The sum of the squares of the first ten natural numbers is,

12 + 22 + ... + 102 = 385

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

(1 + 2 + ... + 10)2 = 552 = 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.

1. 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 10001st prime number?
2. Find the greatest product of five consecutive digits in the 1000-digit number.

73167176531330624919225119674426574742355349194934

96983520312774506326239578318016984801869478851843

85861560789112949495459501737958331952853208805511

12540698747158523863050715693290963295227443043557

66896648950445244523161731856403098711121722383113

62229893423380308135336276614282806444486645238749

30358907296290491560440772390713810515859307960866

70172427121883998797908792274921901699720888093776

65727333001053367881220235421809751254540594752243

52584907711670556013604839586446706324415722155397

53697817977846174064955149290862569321978468622482

83972241375657056057490261407972968652414535100474

82166370484403199890008895243450658541227588666881

16427171479924442928230863465674813919123162824586

17866458359124566529476545682848912883142607690042

24219022671055626321111109370544217506941658960408

07198403850962455444362981230987879927244284909188

84580156166097919133875499200524063689912560717606

05886116467109405077541002256983155200055935729725

71636269561882670428252483600823257530420752963450

1. The sequence of triangle numbers is generated by adding the natural numbers. So the 7th triangle number would be 1 + 2 + 3 + 4 + 5 + 6 + 7 = 28. The first ten terms would be:

1, 3, 6, 10, 15, 21, 28, 36, 45, 55, ...

Let us list the factors of the first seven triangle numbers:

1: 1

3: 1,3

6: 1,2,3,6

10: 1,2,5,10

15: 1,3,5,15

21: 1,3,7,21

28: 1,2,4,7,14,28

We can see that 28 is the first triangle number to have over five divisors.

What is the value of the first triangle number to have over one hundred divisors?