**Name:**

**Advanced Programming in C++**

**Lab Exercise 3/6/2025**

In this exercise, you will be writing some programs that use will use data searching algorithms. In each of these exercises, you are to submit your source code as well as a sample output.

1. Write a program that lets the user enter a charge account number. The program should determine if the number is valid by checking it in the following list:

5658845 4520125 7895122 8777541 8451277 1302850

8080152 4562555 5552012 5050552 7825877 1250255

1005231 6545231 3852085 7576651 7881200 4581002

Initialize a one-dimensional array with these values. Then use a simple linear search to locate the number entered by the user. If the user enters a number that is in the array, the program should display a message saying the number is valid. If the user enters a number not in the array, the program should display a message indicating the number entered is invalid.

Note: I have placed a text file (accounts.txt) with these numbers on the server in the folder

\\ADA\Data Files\C++\Lab Exercise 3.7.2022\

for your convenience.

1. A prime number is any integer that is evenly divisible by itself and 1. The Sieve of Eratosthenes is a method of finding prime numbers. It operates as follows:
   1. Create an array of elements initialized to 1 (true). Array elements with prime subscripts will remain 1. All other array elements will eventually be set to 0 (false). Ignore elements 0 and 1 for this exercise.
   2. Starting with array subscript 2, every time an array element is found whose value is 1, loop through the remainder of the array and set to 0 every element whose subscript is a multiple of the subscript for the element with a value of 1. For array subscript 2, all elements beyond element 2 in the array that are multiples of 2 will be set to 0 (elements 4, 6, 8, 10, etc.); for array subscript 3, all elements beyond element 3 in the array that are multiples of 3 will be set to 0 (elements 6, 9, 12, 15, etc.); and so on.

When this process is complete, the array elements that are still set to 1 indicate that the subscript of that element is a prime number. These subscripts can then be printed. Write a program that uses an array of 10000 elements to determine and print the prime numbers between 2 and 9999. Also report the number of prime numbers that fall in the range of

2 → 99, 100 → 999, and 1000 → 9999