University of Nevada, Las Vegas Computer Science 477/677 Spring 2025

Assignment 1: Due Saturday January 25, 2025

Follow the instructions of the teaching assistant Sabrina Wallace wallas4@unlv.nevada.edu

to turn in homework.

No teaching assistant has yet been assigned to this course, but I have been told that one will be assigned before the end of the first week of classes.

For any assignment that requires writing a program, be sure to turn it in in a form that can be executed.

1. Write a C++ function which determines whether a given integer, which is at least 2, is prime.

```
bool prime(int n)
 // input condition: n >= 2
 {

 }
```

2. Write a C++ program which uses your function to print all primes less than 100.

   Here is an algorithm you could use. Assume $n \geq 2$. If there is some number d in the range $2 \leq d \leq \sqrt{n}$ such that $n\%d = 0$, then n is not prime; otherwise n is prime.

   I will upload a C++ file which contains the program that I wrote for this problem. The file is named primes.cpp. The program implements the algorithm suggested above. It is certainly not the best algorithm for the problem, but it is correct. Here is the output of my program, which prints primes less than 200.

```
2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71 73 79 83 89 97 101 103
107 109 113 127 131 137 139 149 151 157 163 167 173 179 181 191 193 197 199
```

3. Define a *century* to be a set of 100 consecutive positive numbers ending in a multiple of 100. Prove that every century contains at least one prime.

   The statement is false. As numbers get larger, primes become scarcer. There are more primes in the first century than in the second, and eventually, there is a century that has no primes. It is likely quite difficult to find the first case, but here is one.

   Let $N = 200! + 100$. Then the set $\{N + 1, N + 2, \ldots N + 100\}$ is a century which does not contain any prime number.