This is CS50x

CS50’s Introduction to Computer Science

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Prime

Learning Goals

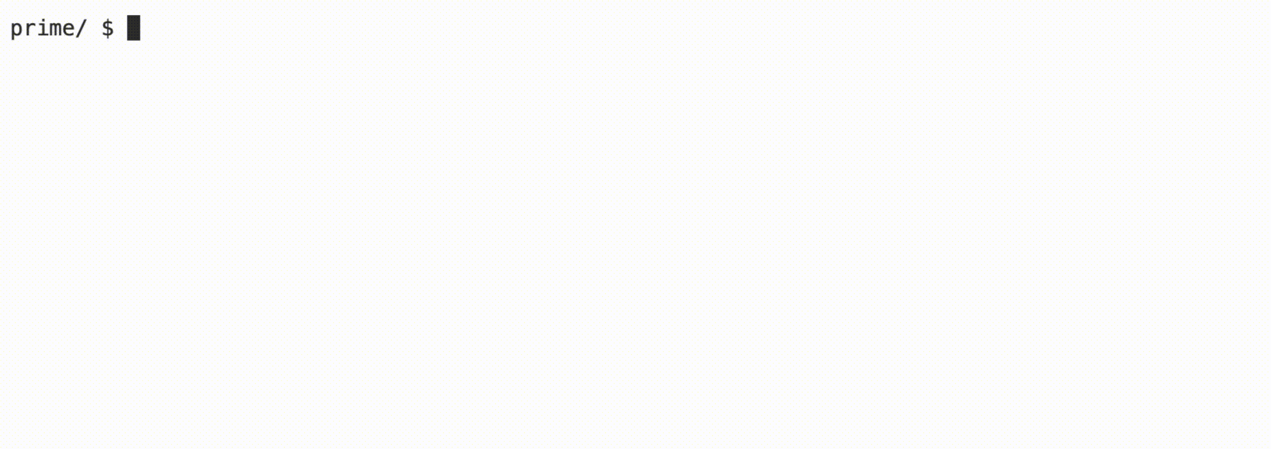
- Practice using `for` loops
- Using modulo
- Creating a Boolean function

Background

Prime numbers (https://en.wikipedia.org/wiki/Prime_number) are defined as whole numbers greater than 1, whose only factors are 1 and itself. So 3 is prime because its only factors are 1 and 3, while 4 is composite and not prime, because it is the product of 2 × 2. In this lab you will write an algorithm to generate all prime numbers in a range specified by the user.

⊞ Hints

Demo



```
prime/ $ █
```

Getting Started

1. Log into code.cs50.io (https://code.cs50.io/) using your GitHub account.
2. Click inside the terminal window and execute `cd`.
3. At the `$` prompt, type `mkdir prime`
4. Now execute `cd prime`
5. Then copy and paste `wget https://cdn.cs50.net/2022/fall/labs/1/prime.c` into your terminal to download this lab's distribution code.
6. You are to complete the Boolean function, `prime`, which tests if a number is prime, and returns true if it is, and false if it is not.

Implementation Details

The easiest way to check if a number is prime, is to try dividing it by every number from 2 up to, but not including, the number itself. If any number divides into it with no remainder, that number is not prime.

The `main` function in the distribution code contains a `for` loop that iterates through the range specified by the user, with both ends inclusive. For example, if the user types in `1` for `min` and `100` for `max`, the `for` loop will test each number, 1 to 100. Each of these numbers is passed to a function, `prime`, that you will implement to return either `true` or `false` depending on whether the number is prime.

Thought Question

- Can you make the prime-finding algorithm more efficient than checking if a number is divisible by every number between 2 and 1 less than itself? Can you think of another way to generate prime numbers?

How to Test Your Code

Your program should behave per the examples below.

```
prime/ $ ./prime
Minimum: 1
Maximum: 100
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
```

You can check your code using `check50`, a program that CS50 will use to test your code when you submit, by typing in the following at the `$` prompt. But be sure to test it yourself as well!

```
check50 cs50/labs/2023/x/prime
```

Green smilies mean your program has passed a test! Red frownies will indicate your program output something unexpected. Visit the URL that `check50` outputs to see the input `check50` handed to your program, what output it expected, and what output your program actually gave.

To evaluate that the style of your code (indentations and spacing) is correct, type in the following at the `$` prompt.

```
style50 prime.c
```

How to Submit

No need to submit! This is an optional practice problem.