EPFL CIVIL-127, Lab 3

March 3, 2026

This week, continue working in the same CIVIL-127 folder as last week. Create a subfolder called lab3.

⚠️ 3.4 and 3.5 might take much longer to solve than the other labs you have done so far; be patient, work through these, and don't just jump to the solution. Seek help from TAs or the forum if needed.

3.1

Implement the Sieve of Eratosthenes for numbers from 2 to 272, as seen in this week's class.

Wikipedia page explaining the algorithm:
https://en.wikipedia.org/wiki/Sieve_of_Eratosthenes

Compare your result with https://oeis.org/A000040/list

3.2

Shorten your Snakes & Ladders implementation from last week by using one of the data structures seen in this week's class.

3.3

Part 1

The following code incorrectly creates a list of lists. Why does setting one element result in many elements being set?

```
grid = [[0] * 8] * 5
print(grid)

grid[4][2] = 99
print(grid)
```

If you are stuck and need a hint, highlight or copy-paste this:

Part 2

Write a program that correctly creates a 5x8 grid. We want to be able to set a single row/col pair without impacting other values.

3.4

N people are standing in a circle. They are numbered 0 to N-1 in clockwise order. Starting from the person numbered 0, every Kth person is removed from the circle.

Write a program to simulate this process and return the number of the last person left in the circle (N and K are constants).

In Python, you can use % to calculate modulo (i.e. *x* % *y* yields *x* modulo *y*).

E.g. if N=5 and K=2:

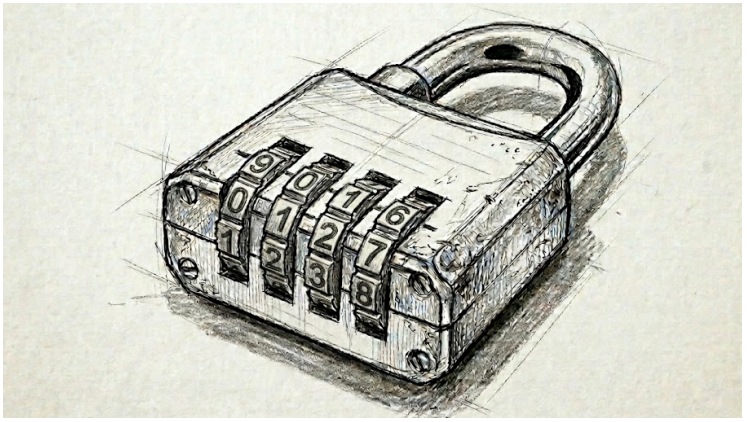
```
Start:

  [0]

4   1

  3 2
```

```
Step 1: 2 is removed

   0

 4   1

  3 x



Step 2: 4 is removed

   0

 x   1

  3 x



 Step 3: 1 is removed

   0

 x   x

  3 x




 Step 4: 0 is removed

   x

 x   x

  3 x
```

The answer is 3.

Note: your program just needs to print the final answer, you don't need to print each intermediate step.

3.5



Find the code for a 4-digit lock. You know the following facts about the code:

- Each digit can be 0 to 9
- Each digit is different
- The sum of the digits is 29
- code * code - 1 is divisible by 13

Write a program which bruteforces the solution. By bruteforce, we mean blindly try every possibility until a solution is found.

In Python, you can use `%` to calculate modulo (i.e. `x % y` yields `x` modulo `y`).

- If you are stuck and need a hint, highlight or copy-paste this:

  [redacted]
- Another hint:

  [redacted]