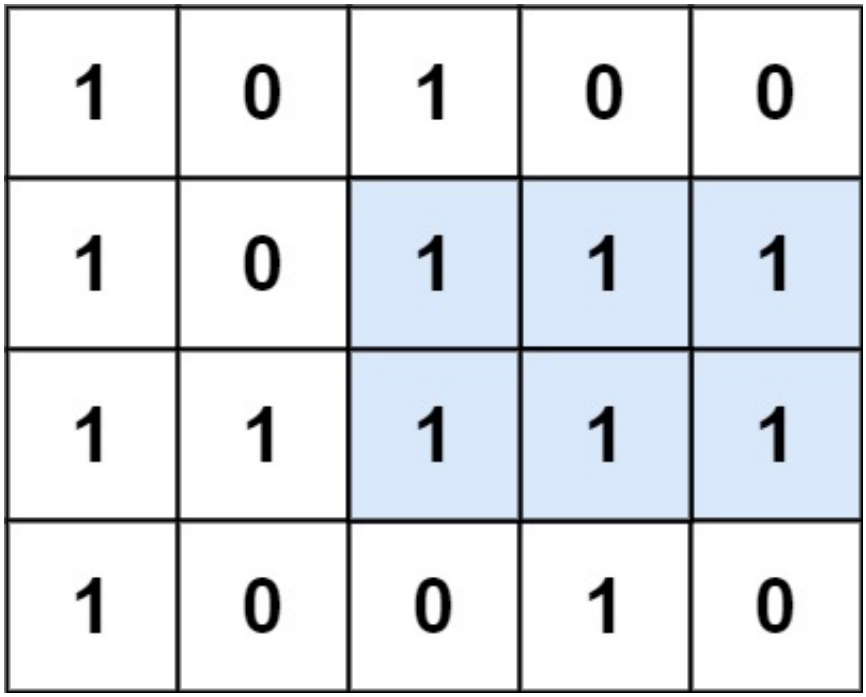
Problem 1

Don't care what happens before and what actually a thing called SLL is. We have a lots of SLLs in Wonderful Land in the form of a `m` × `n` matrix. Each unit can have at most one SLL, and those unit with SLL are marked as `1`, while others are marked as `0`.

Now we are to build a SLL farm. SLL farm is a rectangle in Wondeful Land that only contains unit with SLL inside. All the units inside this rectangle is `1`. Calculate the maxium possible area of a SLL farm given a Wondeful Land.

Example 1:




```
Input: matrix = [["1","0","1","0","0"],["1","0","1","1","1"],
["1","1","1","1","1"],["1","0","0","1","0"]]
Output: 6
Explanation: The maximal rectangle is shown in the above picture.
```

Example 2:

```
Input: matrix = []
Output: 0
```

Example 3:

```
Input: matrix = [["0"]]
Output: 0
```

Example 4:

```
Input: matrix = [["1"]]
Output: 1
```

Example 5:

```
Input: matrix = [["0","0"]]
Output: 0
```

Constraints:

- `0 <= row, cols <= 200`
- `matrix[i][j]` is `'0'` or `'1'`.

Problem 2

We have 3939 bowls of ktt soup, but only one bowl of them can make people not JUAN. We would like to find this bowl.

Suppose we have 12 JUAN monsters. Each JUAN monster can taste the soup for unlimited times. Suppose we have sufficient ktt soup for each bowl. Decide how to find this special ktt soup.

Problem 3

Steve is extremely hungry now! But he has no money or items with him except a bag of special mail letters to send. He has to send all of them to earn a living.

All the `N` villages that he needs to visit are along a circular route. Steve here also has a health point (HP). When he arrives at a village to send his letter, he could immediately take some food to restore his HP. Assume that the HP he could restore at village `i` is `food[i]` . And he will starve again on his way to the next village. Assume that Steve will lost `life[i]` during the travel from village `i` to its next village `i+1`. If HP is below zero, Steve will die.

Steve was just boomed by a creeper. So he has one chance to respawn with `HP=0` in one of the `N` village.

Find the starting village's index if Steve can travel around the circuit once without death in the clockwise direction, otherwise return -1.

Note:

- Both input arrays are non-empty and have the same length.
- Each element in the input arrays is a non-negative integer.

Example 1:

```
Input:
food  = [1,2,3,4,5]
life = [3,4,5,1,2]

Output: 3

Explanation:
Start at village 3 (index 3) and restore 4 HP. Steve HP = 0 + 4 = 4
Travel to village 4. Steve HP = 4 - 1 + 5 = 8
Travel to village 0. Steve HP = 8 - 2 + 1 = 7
Travel to village 1. Steve HP = 7 - 3 + 2 = 6
Travel to village 2. Steve HP = 6 - 4 + 3 = 5
Travel to village 3. The life loss is 5. Steve can just travel back to village
3.
Therefore, return 3 as the starting index.
```

Example 2:

```
Input:
food  = [2,3,4]
life = [3,4,3]

Output: -1

Explanation:
Steve can't start at village 0 or 1, as he has not enough HP to travel to the
next village.
Let's start at village 2 and restore 4 HP. Steve HP = 0 + 4 = 4
Travel to village 0. Steve HP = 4 - 3 + 2 = 3
Travel to village 1. Steve HP = 3 - 3 + 3 = 3
Steve will die when travelling back to village 2, as it requires 4 HP but Steve
only have 3.
Therefore, Steve can't travel around the circuit once no matter where he start.
```

Problem 4

Given an array of integers. Split it into `n` parts, where in every partition, the GCD (greatest common divisor) of left-most number and the right-most number is greater than 1. Find the smallest number `n`.

Example 1:

```
Input: nums = [2, 3, 3, 2, 3, 3]
Ouput: 2 with the partition [2,3,3,2] and [3,3]
```

Example 2:

```
Input: nums = [2, 3, 5, 7]
Output: 4 with the only soultion [2], [3], [5], [7]
```

Problem 5 (Critical Thinking)

Suppose that there is an isolated island with 100 residents. 95 of them are blue eyes and 5 of them are red eyes. They live a mysterious life. Those who are born with red eyes are regarded as evil. But there is a religious tradition on the island:

- They cannot look in the mirror or any relfective surface to know their eye colors.
- One do not tell others about their eye colors.
- Once someone knows the eye color of himself/herself is red, he/she would commit suicide in the night.

One day there is a traveller onboarding the island. He did not know the convention, so when he was celebrating the garnival with the residents, he said: There are red eyes among you guys. As he has broken the religious belief on the island. He was sentenced to death on fire immediately. Now that suppose that every citizen on the island is smart enough, please predict what could happen in the following days.