Superheroes

Type	Input file	Output file	Time limit	Memory limit
Batch	stdin	stdout	0.4 seconds	256 MB

Statement

It's the most ambitious crossover event in history - every superhero from every movie, TV show and comic book you can think of have teamed up against the greatest threat they have ever encountered: N of the biggest, most evil supervillains cooperating to take over the universe!

The crowd of M superheroes quickly strategise, and realise that each supervillain can only be defeated, when a specific subset of superheroes team up to stop them. Since superheroes get tired very easily, each superhero can only defeat one supervillain per day. It is clear that the universe must be rid of this threat as soon as possible. What is the least number of days it would take for the superheroes to defeat all the supervillains, and in how many ways can they accomplish this, modulo $(10^9 + 7)$? **Two ways are different if there exists a supervillain who gets defeated on a different day.**

Input

The first line of input contains 2 integers: N M.

The next N lines of input each contain a string of M binary integers: If the j-th binary integer on the i-th of these lines is set to 1, then the j-th superhero has to be involved to defeat the i-th supervillain.

Output

The output should contain two space-separated integers: the least number of days it would take for the superheroes to defeat all the supervillains, and the number of ways that they can defeat the supervillains modulo $(10^9 + 7)$.

Sample Input

```
5 4
1100
1010
1000
0001
0110
```

Sample Output

```
3 18
```

Explanation

It takes a minimum of three days.

- On the first day, superheroes 1, 2 can defeat supervillain 1, and superhero 4 can defeat supervillain 4.

- On the second day, superheroes 1, 3 can defeat supervillain 2.

- On the third day, superhero 1 can defeat supervillain 3, and superheroes 2, 3 can defeat supervillain 5.

There are a total of 18 ways in which this can be done.

Subtasks and Constraints

For all subtasks, $1 \leq N \leq 16$ and $1 \leq M \leq 65535$.

- For Subtask 1 (8 pts): $N \leq 8$.

- For Subtask 2 (20 pts): The supervillains can be defeated in at most 2 days.

- For Subtask 3 (12 pts): The supervillains can be defeated in at most 3 days.

- For Subtask 4 (15 pts): $N \leq 14$ and the supervillains can be defeated in at most 4 days.

- For Subtask 5 (20 pts): $N \leq 14$.

- For Subtask 6 (25 pts): No further constraints apply.