A. Grass Planting [USACO, Travis Hance, 2011]

Farmer John has N barren pastures (2 <= N <= 100,000) connected by N-1 bidirectional roads, such that there is exactly one path between any two pastures. Bessie, a cow who loves her grazing time, often complains about how there is no grass on the roads between pastures. Farmer John loves Bessie very much, and today he is finally going to plant grass on the roads. He will do so using a procedure consisting of M steps (1 <= M <= 100,000).

At each step one of two things will happen:

- FJ will choose two pastures, and plant a patch of grass along each road in between the two pastures, or,

- Bessie will ask about how many patches of grass on a particular road, and Farmer John must answer her question.

Farmer John is a very poor counter -- help him answer Bessie's questions!

PROBLEM NAME: grassplant

INPUT FORMAT:

* Line 1: Two space-separated integers N and M

* Lines 2..N: Two space-separated integers describing the endpoints of
  a road.

* Lines N+1..N+M: Line i+1 describes step i. The first character of the line is either P or Q, which describes whether or not FJ is planting grass or simply querying. This is followed by two space-separated integers A_i and B_i (1 <= A_i, B_i <= N) which describe FJ's action or query.

SAMPLE INPUT (file grassplant.in):

```
4 6
1 4
2 4
3 4
P 2 3
P 1 3
Q 3 4
```

P 1 4
Q 2 4
Q 1 4

OUTPUT FORMAT:

* Lines 1..???: Each line has the answer to a query, appearing in the same order as the queries appear in the input.

SAMPLE OUTPUT (file grassplant.out):

2
1
2

B. Дырокол

Квадратный клетчатый лист бумаги 2^Nx2^N клеток начинают складывать следующим образом. Сначала нижняя половина листа накладывается на верхнюю, затем правая половина листа накладывается на левую. Эту операцию повторяют N–3 раза, в результате чего получается сложенный лист 8x8 клеток. Какие-то из клеток этого сложенного листа удаляются при помощи дырокола.

После развертывания исходный лист распадется на некоторое количество связных частей, т.е. таких множеств клеток, что из любой клетки одного множества можно пройти до любой другой, переходя каждый раз на соседнюю по вертикали или горизонтали клетку. Напишите программу, вычисляющую число частей, на которые распадется лист.

Входные данные

Первая строка входного файла содержит целое число N ($4 <= N <= 500$). В следующих 8 строках записана матрица 8x8 из нулей и единиц, разделенных пробелом. Единицами отмечены клетки, выкалываемые дыроколом из сложенного листа 8x8.

Выходные данные

Вывести в выходной файл искомое число частей.

Пример входного файла (puncher.in)

```
4
0 1 0 0 0 0 1 0
1 0 0 0 0 0 1 1
0 0 0 0 0 0 0 0
0 0 0 1 1 0 0 0
0 0 0 1 1 0 0 0
0 0 0 1 0 1 0 0
0 0 0 0 1 0 0 0
0 0 0 0 0 0 0 0
```

Пример выходного файла (puncher.out)

```
11
```

C.Ufologist

Artem is a ufologist. For the last 10 years or so, he has been involved into various researches trying to prove the existence of extraterrestrial civilizations. One of this researches is analyzing signals coming from the outer space. Artem has a satellite antenna, on top of his house, connected to his computer. Every day the antenna collects some data and a program, which Artem wrote himself, will filter it from junk and convert the rest into a string of lowercase English letters. Artem then analyzes these strings as part of his research.

After reading the string which was generated today Artem had a feeling that this string is a substring of the string which was generated 1024 days ago. If it was true, it could be a very good clue towards proving that we are not the only civilization in the universe. So he rushed into his CD archive to restore the string which was generated 1024 days ago, but unfortunately for him the CD which contained the string was damaged and he could only restore some parts of it.

He was disappointed, but not for a long time, because Artem also likes making problems for programming competitions and an interesting problem came into his mind: how many different strings can be restored from the damaged string so that they contain the string which was generated today as a substring?

Input

The first line of the input file contains the string which Artem's computer generated today. It is a non-empty string of lowercase English letters with length not greater than 200.

The second line contains the damaged string. It is a non-empty string of lowercase English letters or question marks with length not greater than 200. A question mark denotes that the letter could not be restored.

Output

A single line of the output file must contain the answer to the problem modulo $10^9 + 7$.

Sample test(s)

input1:

```
a
abc
```

output1:

```
1
```

input2:

```
a
?bc
```

output2:

```
1
```

input3:

```
a
a?c
```

output3:

```
26
```

Note

Note that in some test cases undamaged part can already contain the searched string, or the whole string can be undamaged, but we are still interested in the answer.