A. Pangram

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

A word or a sentence in some language is called a *pangram* if all the characters of the alphabet of this language appear in it *at least once*. Pangrams are often used to demonstrate fonts in printing or test the output devices.

You are given a string consisting of lowercase and uppercase Latin letters. Check whether this string is a pangram. We say that the string contains a letter of the Latin alphabet if this letter occurs in the string in uppercase or lowercase.

Input

The first line contains a single integer n $(1 \le n \le 100)$ — the number of characters in the string.

The second line contains the string. The string consists only of uppercase and lowercase Latin letters.

Output

Output "`YES`", if the string is a pangram and "`NO`" otherwise.

Sample test(s)

input

```
12
toosmallword
```

output

```
NO
```

input

```
35
TheQuickBrownFoxJumpsOverTheLazyDog
```

output

```
YES
```

B. Two Buttons

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Vasya has found a strange device. On the front panel of a device there are: a red button, a blue button and a display showing some positive integer. After clicking the red button, device multiplies the displayed number by two. After clicking the blue button, device subtracts one from the number on the display. If at some point the number stops being positive, the device breaks down. The display can show arbitrarily large numbers. Initially, the display shows number n.

Bob wants to get number m on the display. What minimum number of clicks he has to make in order to achieve this result?

Input

The first and the only line of the input contains two distinct integers n and m ($1 \le n, m \le 10^4$), separated by a space .

Output

Print a single number — the minimum number of times one needs to push the button required to get the number m out of number n.

Sample test(s)

input
```
4 6
```
output
```
2
```

input
```
10 1
```
output
```
9
```

Note

In the first example you need to push the blue button once, and then push the red button once.

In the second example, doubling the number is unnecessary, so we need to push the blue button nine times.

C. DNA Alignment

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Vasya became interested in bioinformatics. He's going to write an article about similar cyclic DNA sequences, so he invented a new method for determining the similarity of cyclic sequences.

Let's assume that strings s and t have the same length n, then the function $h(s, t)$ is defined as the number of positions in which the respective symbols of s and t are *the same*. Function $h(s, t)$ can be used to define the function of Vasya distance $\rho(s, t)$:

$$\rho(s,t) = \sum_{i=0}^{n-1} \sum_{j=0}^{n-1} h(\operatorname{shift}(s,i), \operatorname{shift}(t,j)),$$

where $\operatorname{shift}(s, i)$ is obtained from string s, by applying left circular shift i times. For example,

$$\rho(\text{"}AGC\text{"}, \text{"}CGT\text{"}) =$$
$$h(\text{"}AGC\text{"}, \text{"}CGT\text{"}) + h(\text{"}AGC\text{"}, \text{"}GTC\text{"}) + h(\text{"}AGC\text{"}, \text{"}TCG\text{"}) +$$
$$h(\text{"}GCA\text{"}, \text{"}CGT\text{"}) + h(\text{"}GCA\text{"}, \text{"}GTC\text{"}) + h(\text{"}GCA\text{"}, \text{"}TCG\text{"}) +$$
$$h(\text{"}CAG\text{"}, \text{"}CGT\text{"}) + h(\text{"}CAG\text{"}, \text{"}GTC\text{"}) + h(\text{"}CAG\text{"}, \text{"}TCG\text{"}) =$$
$$1 + 1 + 0 + 0 + 1 + 1 + 1 + 0 + 1 = 6$$

Vasya found a string s of length n on the Internet. Now he wants to count how many strings t there are such that the Vasya distance from the string s attains maximum possible value. Formally speaking, t must satisfy the equation: $\rho(s,t) = \max_{u:|u|=|s|} \rho(s,u)$.

Vasya could not try all possible strings to find an answer, so he needs your help. As the answer may be very large, count the number of such strings modulo $10^9 + 7$.

Input

The first line of the input contains a single integer n ($1 \le n \le 10^5$).

The second line of the input contains a single string of length n, consisting of characters "ACGT".

Output

Print a single number — the answer modulo $10^9 + 7$.

Sample test(s)

input
```
1
C
```
output
```
1
```

input
```
2
AG
```
output
```
4
```

input
```
3
TTT
```
output
```
1
```

Note

Please note that if for two distinct strings t_1 and t_2 values $\rho(s, t_1)$ и $\rho(s, t_2)$ are maximum among all possible t, then both strings must be taken into account in the answer even if one of them can be obtained by a circular shift of another one.

In the first sample, there is $\rho(\text{"}C\text{"}, \text{"}C\text{"}) = 1$, for the remaining strings t of length 1 the value of $\rho(s, t)$ is 0.

In the second sample, $\rho(\text{"}AG\text{"}, \text{"}AG\text{"}) = \rho(\text{"}AG\text{"}, \text{"}GA\text{"}) = \rho(\text{"}AG\text{"}, \text{"}AA\text{"}) = \rho(\text{"}AG\text{"}, \text{"}GG\text{"}) = 4$.

In the third sample, $\rho(\text{"}TTT\text{"}, \text{"}TTT\text{"}) = 27$

D. Cubes

time limit per test: 3 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Once Vasya and Petya assembled a figure of m cubes, each of them is associated with a number between 0 and $m - 1$ (inclusive, each number appeared exactly once). Let's consider a coordinate system such that the OX is the ground, and the OY is directed upwards. Each cube is associated with the coordinates of its lower left corner, these coordinates are integers for each cube.

The figure turned out to be *stable*. This means that for any cube that is not on the ground, there is at least one cube under it such that those two cubes touch **by a side or a corner**. More formally, this means that for the cube with coordinates (x, y) either $y = 0$, or there is a cube with coordinates $(x - 1, y - 1)$, $(x, y - 1)$ or $(x + 1, y - 1)$.

Now the boys want to disassemble the figure and put all the cubes in a row. In one step the cube is removed from the figure and being put to the right of the blocks that have already been laid. The guys remove the cubes in such order that the figure remains stable. To make the process more interesting, the guys decided to play the following game. The guys take out the cubes from the figure in turns. It is easy to see that after the figure is disassembled, the integers written on the cubes form a number, written in the m-ary positional numerical system (possibly, with a leading zero). Vasya wants the resulting number to be maximum possible, and Petya, on the contrary, tries to make it as small as possible. Vasya starts the game.

Your task is to determine what number is formed after the figure is disassembled, if the boys play optimally. Determine the remainder of the answer modulo $10^9 + 9$.

Input

The first line contains number m ($2 \le m \le 10^5$).

The following m lines contain the coordinates of the cubes x_i, y_i ($-10^9 \le x_i \le 10^9$, $0 \le y_i \le 10^9$) in ascending order of numbers written on them. It is guaranteed that the original figure is stable.

No two cubes occupy the same place.

Output

In the only line print the answer to the problem.

Sample test(s)

input

```
3
2 1
1 0
0 1
```

output

```
19
```

input

```
5
0 0
0 1
0 2
0 3
0 4
```

output

```
2930
```

E. Pluses everywhere

time limit per test: 3 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Vasya is sitting on an extremely boring math class. To have fun, he took a piece of paper and wrote out n numbers on a single line. After that, Vasya began to write out different ways to put pluses ("`+`") in the line between certain digits in the line so that the result was a correct arithmetic expression; formally, no two pluses in such a partition can stand together (between any two adjacent pluses there must be at least one digit), and no plus can stand at the beginning or the end of a line. For example, in the string `100500`, ways `100500` (add no pluses), `1+00+500` or `10050+0` are correct, and ways `100++500`, `+1+0+0+5+0+0` or `100500+` are incorrect.

The lesson was long, and Vasya has written all the correct ways to place exactly k pluses in a string of digits. At this point, he got caught having fun by a teacher and he was given the task to calculate the sum of all the resulting arithmetic expressions by the end of the lesson (when calculating the value of an expression the leading zeros should be ignored). As the answer can be large, Vasya is allowed to get only its remainder modulo $10^9 + 7$. Help him!

Input

The first line contains two integers, n and k ($0 \le k < n \le 10^5$).

The second line contains a string consisting of n digits.

Output

Print the answer to the problem modulo $10^9 + 7$.

Sample test(s)

input

```
3 1
108
```

output

```
27
```

input

```
3 2
108
```

output

```
9
```

Note

In the first sample the result equals $(1 + 08) + (10 + 8) = 27$.

In the second sample the result equals $1 + 0 + 8 = 9$.