Problem A. Ambar's Obsession

Input file:	standard input
Output file:	standard output
Time limit:	2 seconds
Memory limit:	256 megabytes

Ambar is very particular about numbers. There are K digits that he dislikes: $\{D_1, D_2, ..., D_K\}$

He is shopping, and now paying at the cashier. His total is N taka (the currency of Bangladesh), thus he has to hand at least N taka to the cashier (and possibly receive the change).

However, as mentioned before, he is very particular about numbers. When he hands money to the cashier, the decimal notation of the amount must not contain any digits that he dislikes. Under this condition, he will hand the minimum amount of money.

Find the amount of money that he will hand to the cashier.

Constraints:

$1 \leq N \leq 10000$

$1 \leq K < 10$

$0 \leq D_1 < D_2 < ... < D_9 \leq 9$

$\{D_1, D_2, ..., D_K\} \neq \{1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 7,\ 8,\ 9\}$

Input

The input is given from Standard Input in the following format:

$N\ K$

$D_1\ D_2\ ...\ D_K$

Output

Print the amount of money that Ambar will hand to the cashier.

Examples

standard input	standard output
1000 8 1 3 4 5 6 7 8 9	2000
9999 1 0	9999

Note

Attribution: AtCoder Regular Contest 058, Problem C (http://arc058.contest.atcoder.jp/tasks/arc058_a)

Problem B. Ambar and Unbalanced Strings

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Given a string T, we will call it unbalanced if and only if the length of T is at least 2, and more than half of the letters in T are the same. For example, both "`voodoo`" and "`melee`" are unbalanced, while neither "`noon`" nor "`a`" is.

Ambar has a string S consisting of lowercase letters. He would like to determine if there exists a (contiguous) substring of S that is unbalanced. If the answer is yes, he also wants to find one such substring.

Input

A single string S ($2 \leq |S| \leq 10^5$)

Output

If there exists no unbalanced substring of S, print `-1 -1`.

If there exists an unbalanced substring of S, let one such substring be $S_a S_{a+1} \ldots S_b$ ($1 \leq a < b \leq |S|$), and print a b. If there exists more than one such substring, any of them will be accepted.

Examples

standard input	standard output
needed	2 3
atcoder	-1 -1

Note

Attribution: AtCoder Regular Contest 059 Problem D (http://arc059.contest.atcoder.jp/tasks/arc059_b)

Problem C. Ambar and Bit Strings

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	64 megabytes

Recently Ambar has become very interested in bit strings, that is strings where every letter belongs to the set $\{0, 1\}$. In particular, he likes primitive bit strings. A bit string S is not primitive if there exists some string T, and some integer $k > 1$, such that S is just T repeated k times.

So, for example, 1011 is a primitive bit string of length 4, whereas 1010, and 1111 are not, since 1010 is just 10 repeated twice, and 1111 is just 1 repeated 4 times.

Ambar wants to count the number of primitive bit strings of length N. Sadly he is very weak, and needs you to help.

Input

A single integer, N ($1 \leq N \leq 100$).

Output

A single integer, the number of primitive bit strings of length N, $\bmod(10^9 + 7)$.

Examples

standard input	standard output
1	2
3	6
4	12

Note

The primitive bit strings of length 4 are $\{0001, 0010, 0011, 0100, 0110, 0111, 1000, 1001, 1011, 1100, 1101, 1110\}$.

Problem D. Ambar and a Grid

Input file:	standard input
Output file:	standard output
Time limit:	2 seconds
Memory limit:	256 megabytes

We have a large square grid with H rows and W columns. Ambar is now standing in the top-left cell. He will repeat going right or down to the adjacent cell, until he reaches the bottom-right cell.

However, he cannot enter the cells in the intersection of the bottom A rows and the leftmost B columns. (That is, there are $A \times B$ forbidden cells.) There is no restriction on entering the other cells.

Find the number of ways he can travel to the bottom-right cell.

Since this number can be extremely large, print the number $\bmod(10^9 + 7)$.

Input

The first and only line of input contains four space separated integers, H, W, A, and B. ($1 \leq A < H \leq 10^5$, $1 \leq B < W \leq 10^5$).

Output

Print the number of ways Ambar can travel to the bottom-right cell, $\bmod(10^9 + 7)$.

Examples

standard input	standard output
2 3 1 1	2
10 7 3 4	3570
100000 100000 99999 99999	1
100000 100000 44444 55555	738162020

Note

Attribution: AtCoder Regular Contest 058 Problem D (http://arc058.contest.atcoder.jp/tasks/arc058_b)