Educational Codeforces Round 8

A. Tennis Tournament

1 second, 256 megabytes

A tennis tournament with n participants is running. The participants are playing by an olympic system, so the winners move on and the losers drop out.

The tournament takes place in the following way (below, m is the number of the participants of the current round):

- let k be the maximal power of the number 2 such that $k \le m$,
- k participants compete in the current round and a half of them passes to the next round, the other m - k participants pass to the next round directly,
- when only one participant remains, the tournament finishes.

Each match requires b bottles of water for each participant and one bottle for the judge. Besides p towels are given to each participant for the whole tournament.

Find the number of bottles and towels needed for the tournament.

Note that it's a tennis tournament so in each match two participants compete (one of them will win and the other will lose).

Input

The only line contains three integers n, b, p $(1 \le n, b, p \le 500)$ — the number of participants and the parameters described in the problem statement.

Output

Print two integers x and y — the number of bottles and towels need for the tournament.

input
5 2 3
output
20 15

input
8 2 4
output
35 32

In the first example will be three rounds:

1. in the first round will be two matches and for each match 5 bottles of water are needed (two for each of the participants and one for the judge),
2. in the second round will be only one match, so we need another 5 bottles of water,
3. in the third round will also be only one match, so we need another 5 bottles of water.

So in total we need 20 bottles of water.

In the second example no participant will move on to some round directly.

B. New Skateboard

1 second, 256 megabytes

Max wants to buy a new skateboard. He has calculated the amount of money that is needed to buy a new skateboard. He left a calculator on the floor and went to ask some money from his parents. Meanwhile his little brother Yusuf came and started to press the keys randomly. Unfortunately Max has forgotten the number which he had calculated. The only thing he knows is that the number is divisible by 4.

You are given a string s consisting of digits (the number on the display of the calculator after Yusuf randomly pressed the keys). Your task is to find the number of substrings which are divisible by 4. A substring can start with a zero.

A substring of a string is a nonempty sequence of consecutive characters.

For example if string s is `124` then we have four substrings that are divisible by 4: `12`, `4`, `24` and `124`. For the string `04` the answer is three: `0`, `4`, `04`.

As input/output can reach huge size it is recommended to use fast input/output methods: for example, prefer to use `gets/scanf/printf` instead of `getline/cin/cout` in C++, prefer to use `BufferedReader/PrintWriter` instead of `Scanner/System.out` in `Java`.

Input
The only line contains string s ($1 \le |s| \le 3 \cdot 10^5$). The string s contains only digits from 0 to 9.

Output
Print integer a — the number of substrings of the string s that are divisible by 4.

Note that the answer can be huge, so you should use 64-bit integer type to store it. In `C++` you can use the `long long` integer type and in `Java` you can use `long` integer type.

input
124
output
4

input
04
output
3

input
5810438174
output
9

C. Bear and String Distance

1 second, 256 megabytes

Limak is a little polar bear. He likes **nice** strings — strings of length n, consisting of lowercase English letters only.

The distance between two letters is defined as the difference between their positions in the alphabet. For example, $\text{dist}(\text{c}, \text{e}) = \text{dist}(\text{e}, \text{c}) = 2$, and $\text{dist}(\text{a}, \text{z}) = \text{dist}(\text{z}, \text{a}) = 25$.

Also, the distance between two nice strings is defined as the sum of distances of corresponding letters. For example, $\text{dist}(\text{af}, \text{db}) = \text{dist}(\text{a}, \text{d}) + \text{dist}(\text{f}, \text{b}) = 3 + 4 = 7$, and $\text{dist}(\text{bear}, \text{roar}) = 16 + 10 + 0 + 0 = 26$.

Limak gives you a nice string s and an integer k. He challenges you to find any nice string s' that $\text{dist}(\text{s}, \text{s}') = k$. Find any s' satisfying the given conditions, or print `"-1"` if it's impossible to do so.

As input/output can reach huge size it is recommended to use fast input/output methods: for example, prefer to use `gets/scanf/printf` instead of `getline/cin/cout` in C++, prefer to use `BufferedReader/PrintWriter` instead of `Scanner/System.out` in `Java`.

Input
The first line contains two integers n and k ($1 \le n \le 10^5$, $0 \le k \le 10^6$).

The second line contains a string s of length n, consisting of lowercase English letters.

Output
If there is no string satisfying the given conditions then print `"-1"` (without the quotes).

Otherwise, print any nice string s' that $\text{dist}(\text{s}, \text{s}') = k$.

input
4 26 bear
output
roar

input
2 7 af
output
db

input
3 1000 hey
output
-1

D. Magic Numbers

2 seconds, 256 megabytes

Consider the decimal presentation of an integer. Let's call a number `d-magic` if digit d appears in decimal presentation of the number on even positions and nowhere else.

For example, the numbers 1727374, 17, 1 are `7-magic` but 77, 7, 123, 34, 71 are not `7-magic`. On the other hand the number 7 is `0-magic`, 123 is `2-magic`, 34 is `4-magic` and 71 is `1-magic`.

Find the number of `d-magic` numbers in the segment $[a, b]$ that are multiple of m. Because the answer can be very huge you should only find its value modulo $10^9 + 7$ (so you should find the remainder after dividing by $10^9 + 7$).

Input

The first line contains two integers m, d ($1 \le m \le 2000$, $0 \le d \le 9$) — the parameters from the problem statement.

The second line contains positive integer a in decimal presentation (without leading zeroes).

The third line contains positive integer b in decimal presentation (without leading zeroes).

It is guaranteed that $a \le b$, the number of digits in a and b are the same and don't exceed 2000.

Output

Print the only integer a — the remainder after dividing by $10^9 + 7$ of the number of `d-magic` numbers in segment $[a, b]$ that are multiple of m.

input
2 6 10 99
output
8

input
2 0 1 9
output
4

input
19 7 1000 9999
output
6

The numbers from the answer of the first example are 16, 26, 36, 46, 56, 76, 86 and 96.

The numbers from the answer of the second example are 2, 4, 6 and 8.

The numbers from the answer of the third example are 1767, 2717, 5757, 6707, 8797 and 9747.

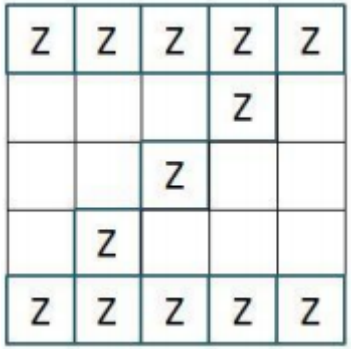
E. Zbazi in Zeydabad

5 seconds, 512 megabytes

A tourist wants to visit country Zeydabad for Zbazi (a local game in Zeydabad).

The country Zeydabad is a rectangular table consisting of n rows and m columns. Each cell on the country is either `'z'` or `'.'`.

The tourist knows this country is named Zeydabad because there are lots of "`Z-pattern`"s in the country. A "`Z-pattern`" is a square which anti-diagonal is completely filled with `'z'` and its upper and lower rows are also completely filled with `'z'`. All other cells of a square can be arbitrary.



Note that a "Z-pattern" can consist of only one cell (see the examples).

So he wants to count the number of "Z-pattern"s in the country (a necessary skill for Zbazi).

Now your task is to help tourist with counting number of "Z-pattern"s.

As input/output can reach huge size it is recommended to use fast input/output methods: for example, prefer to use `gets/scanf/printf` instead of `getline/cin/cout` in C++, prefer to use `BufferedReader/PrintWriter` instead of `Scanner/System.out` in `Java`.

Input

The first line contains two integers n, m $(1 \le n, m \le 3000)$ — the number of rows and columns respectively.

Each of the next n lines contains m characters `'z'` or `'.'` — the description of Zeydabad.

Output

Print the only integer a — the number of "Z-pattern"s in Zeydabad.

input
4 4 zzzz zzz. .z.. zzzz
output
16

input
1 4 z.z.
output
2

input
2 2 zz zz
output
5

F. Bear and Fair Set

2 seconds, 256 megabytes

Limak is a grizzly bear. He is big and dreadful. You were chilling in the forest when you suddenly met him. It's very unfortunate for you. He will eat all your cookies unless you can demonstrate your mathematical skills. To test you, Limak is going to give you a puzzle to solve.

It's a well-known fact that Limak, as every bear, owns a set of numbers. You know some information about the set:

- The elements of the set are distinct positive integers.
- The number of elements in the set is n. The number n is divisible by 5.
- All elements are between 1 and b, inclusive: bears don't know numbers greater than b.
- For each r in $\{0, 1, 2, 3, 4\}$, the set contains exactly $\frac{n}{5}$ elements that give remainder r when divided by 5. (That is, there are $\frac{n}{5}$ elements divisible by 5, $\frac{n}{5}$ elements of the form $5k+1$, $\frac{n}{5}$ elements of the form $5k+2$, and so on.)

Limak smiles mysteriously and gives you q hints about his set. The i-th hint is the following sentence: "If you only look at elements that are between 1 and $upTo_i$, inclusive, you will find exactly $quantity_i$ such elements in my set."

In a moment Limak will tell you the actual puzzle, but something doesn't seem right... That smile was very strange. You start to think about a possible reason. Maybe Limak cheated you? Or is he a fair grizzly bear?

Given n, b, q and hints, check whether Limak can be fair, i.e. there exists at least one set satisfying the given conditions. If it's possible then print ''fair". Otherwise, print ''unfair".

Input

The first line contains three integers n, b and q ($5 \le n \le b \le 10^4$, $1 \le q \le 10^4$, n divisible by 5) — the size of the set, the upper limit for numbers in the set and the number of hints.

The next q lines describe the hints. The i-th of them contains two integers $upTo_i$ and $quantity_i$ ($1 \le upTo_i \le b$, $0 \le quantity_i \le n$).

Output

Print ''fair" if there exists at least one set that has all the required properties and matches all the given hints. Otherwise, print ''unfair".

input
10 20 1 10 10
output
fair

input
10 20 3 15 10 5 0 10 5
output
fair

input
10 20 2 15 3 20 10
output
unfair

In the first example there is only one set satisfying all conditions: {1,2,3,4,5,6,7,8,9,10}.

In the second example also there is only one set satisfying all conditions: {6,7,8,9,10,11,12,13,14,15}.

Easy to see that there is no set satisfying all conditions from the third example. So Limak lied to you :-(