Codeforces Round #129 (Div. 1)

A. Little Elephant and Interval

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

The Little Elephant very much loves sums on intervals.

This time he has a pair of integers l and r ($l \le r$). The Little Elephant has to find the number of such integers x ($l \le x \le r$), that the first digit of integer x equals the last one (in decimal notation). For example, such numbers as 101, 477474 or 9 will be included in the answer and 47, 253 or 1020 will not.

Help him and count the number of described numbers x for a given pair l and r.

Input
The single line contains a pair of integers l and r ($1 \le l \le r \le 10^{18}$) — the boundaries of the interval.

Please, do not use the `%lld` specifier to read or write 64-bit integers in C++. It is preferred to use `cin`, `cout` streams or the `%I64d` specifier.

Output
On a single line print a single integer — the answer to the problem.

Examples

input
2 47
output
12

input
47 1024
output
98

Note
In the first sample the answer includes integers `2, 3, 4, 5, 6, 7, 8, 9, 11, 22, 33, 44`.

B. Little Elephant and Cards

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

The Little Elephant loves to play with color cards.

He has n cards, each has exactly two colors (the color of the front side and the color of the back side). Initially, all the cards lay on the table with the front side up. In one move the Little Elephant can turn any card to the other side. The Little Elephant thinks that a set of cards on the table is funny if at least half of the cards have the same color (for each card the color of the upper side is considered).

Help the Little Elephant to find the minimum number of moves needed to make the set of n cards funny.

Input

The first line contains a single integer n ($1 \le n \le 10^5$) — the number of the cards. The following n lines contain the description of all cards, one card per line. The cards are described by a pair of positive integers not exceeding 10^9 — colors of both sides. The first number in a line is the color of the front of the card, the second one — of the back. The color of the front of the card may coincide with the color of the back of the card.

The numbers in the lines are separated by single spaces.

Output

On a single line print a single integer — the sought minimum number of moves. If it is impossible to make the set funny, print -1.

Examples

input
3 4 7 4 7 7 4
output
0

input
5 4 7 7 4 2 11 9 7 1 1
output
2

Note

In the first sample there initially are three cards lying with colors 4, 4, 7. Since two of the three cards are of the same color 4, you do not need to change anything, so the answer is 0.

In the second sample, you can turn the first and the fourth cards. After that three of the five cards will be of color 7.

C. Little Elephant and Furik and Rubik

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

Little Elephant loves Furik and Rubik, who he met in a small city Kremenchug.

The Little Elephant has two strings of equal length a and b, consisting only of uppercase English letters. The Little Elephant selects a pair of substrings of equal length — the first one from string a, the second one from string b. The choice is equiprobable among all possible pairs. Let's denote the substring of a as x, and the substring of b — as y. The Little Elephant gives string x to Furik and string y — to Rubik.

Let's assume that $f(x, y)$ is the number of such positions of i ($1 \le i \le |x|$), that $x_i = y_i$ (where $|x|$ is the length of lines x and y, and x_i, y_i are the i-th characters of strings x and y, correspondingly). Help Furik and Rubik find the expected value of $f(x, y)$.

Input

The first line contains a single integer n ($1 \le n \le 2 \cdot 10^5$) — the length of strings a and b. The second line contains string a, the third line contains string b. The strings consist of uppercase English letters only. The length of both strings equals n.

Output

On a single line print a real number — the answer to the problem. The answer will be considered correct if its relative or absolute error does not exceed 10^{-6}.

Examples

input
2 AB BA
output
0.400000000

input
3 AAB CAA
output
0.642857143

Note

Let's assume that we are given string $a = a_1 a_2 \dots a_{|a|}$, then let's denote the string's length as $|a|$, and its i-th character — as a_i.

A substring $a[l \dots r]$ ($1 \le l \le r \le |a|$) of string a is string $a_l a_{l+1} \dots a_r$.

String a is a substring of string b, if there exists such pair of integers l and r ($1 \le l \le r \le |b|$), that $b[l \dots r] = a$.

Let's consider the first test sample. The first sample has 5 possible substring pairs: `("A", "B")`, `("A", "A")`, `("B", "B")`, `("B", "A")`, `("AB", "BA")`. For the second and third pair value $f(x, y)$ equals 1, for the rest it equals 0. The probability of choosing each pair equals $\frac{1}{5}$, that's why the answer is $\frac{1}{5} \cdot 0 + \frac{1}{5} \cdot 1 + \frac{1}{5} \cdot 1 + \frac{1}{5} \cdot 0 + \frac{1}{5} \cdot 0 = \frac{2}{5} = 0.4$.

D. Little Elephant and Retro Strings

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

The Little Elephant has found a ragged old black-and-white string s on the attic.

The characters of string s are numbered from the left to the right from 1 to $|s|$, where $|s|$ is the length of the string. Let's denote the i-th character of string s as s_i. As the string is black-and-white, each character of the string is either letter "B", or letter "W". Unfortunately, the string is very old and some characters are damaged. The damaged positions are denoted as "X".

The Little Elephant in determined to restore the string and hang it on the wall. For that he needs to replace each character "X" by a "B" or a "W". The string must look good on the wall, so it must be *beautiful*. The Little Elephant considers a string beautiful if it has two non-intersecting substrings of a given length k, such that the left one fully consists of characters "B", and the right one fully consists of characters "W". More formally, there are four integers a, b, c, d $(1 \le a \le b < c \le d \le |s|;\ b - a + 1 = d - c + 1 = k)$ such that s_i = "B" $(a \le i \le b)$ and s_j = "W" $(c \le j \le d)$.

Help the Little Elephant find the number of different beautiful strings he can obtain from string s. Two strings are considered different if there is such position, where the character in the first string differs from the corresponding character in the second string. If this string doesn't contain characters «X» and it is already beautiful — the answer is 1.

As the answer can be rather large, print it modulo 1000000007 $(10^9 + 7)$.

Input

The first line contains two space-separated integers n and k $(1 \le k \le n \le 10^6)$. The second line contains string s. String s has length n and only consists of characters "W", "B" and "X".

Output

On a single line print an integer — the answer to the problem modulo 1000000007 $(10^9 + 7)$.

Examples

input
3 2 XXX
output
0

input
4 2 XXXX
output
1

input
10 2 XXBXXWXXXX
output
166

E. Little Elephant and Strings

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

The Little Elephant loves strings very much.

He has an array a from n strings, consisting of lowercase English letters. Let's number the elements of the array from 1 to n, then let's denote the element number i as a_i. For each string a_i $(1 \le i \le n)$ the Little Elephant wants to find the number of pairs of integers l and r $(1 \le l \le r \le |a_i|)$ such that substring $a_i[l \ldots r]$ is a substring to at least k strings from array a (including the i-th string).

Help the Little Elephant solve this problem.

If you are not familiar with the basic notation in string problems, you can find the corresponding definitions in the notes.

Input

The first line contains two space-separated integers — n and k $(1 \le n, k \le 10^5)$. Next n lines contain array a. The i-th line contains a non-empty string a_i, consisting of lowercase English letter. The total length of all strings a_i does not exceed 10^5.

Output

On a single line print n space-separated integers — the i-th number is the answer for string a_i.

Please, do not use the %lld specifier to read or write 64-bit integers in C++. It is preferred to use the cin, cout streams or the %I64d specifier.

Examples

input
3 1 abc a ab
output
6 1 3

input
7 4 rubik furik abab baba aaabbbababa abababababa zero
output
1 0 9 9 21 30 0

Note

Let's assume that you are given string $a = a_1 a_2 \ldots a_{|a|}$, then let's denote the string's length as $|a|$ and the string's i-th character as a_i.

A substring $a[l \ldots r]$ $(1 \le l \le r \le |a|)$ of string a is string $a_l a_{l+1} \ldots a_r$.

String a is a substring of string b, if there exists such pair of integers l and r $(1 \le l \le r \le |b|)$, that $b[l \ldots r] = a$.