

G. Replace All

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

Igor the analyst is at work. He learned about a feature in his text editor called "Replace All". Igor is too bored at work and thus he came up with the following problem:

Given two strings x and y which consist of the English letters 'A' and 'B' only, a pair of strings (s, t) is called good if:

- s and t consist of the characters '0' and '1' only.
- $1 \leq |s|, |t| \leq n$, where $|z|$ denotes the length of string z , and n is a fixed positive integer.
- If we replace all occurrences of 'A' in x and y with the string s , and replace all occurrences of 'B' in x and y with the string t , then the two obtained from x and y strings are equal.

For example, if $x = \text{AAB}$, $y = \text{BB}$ and $n = 4$, then $(01, 0101)$ is one of good pairs of strings, because both obtained after replacing strings are "01010101".

The flexibility of a pair of strings x and y is the number of pairs of good strings (s, t) . The pairs are ordered, for example the pairs $(0, 1)$ and $(1, 0)$ are different.

You're given two strings c and d . They consist of characters 'A', 'B' and '?' only. Find the sum of flexibilities of all possible pairs of strings (c', d') such that c' and d' can be obtained from c and d respectively by replacing the question marks with either 'A' or 'B', modulo $10^9 + 7$.

Input

The first line contains the string c ($1 \leq |c| \leq 3 \cdot 10^5$).

The second line contains the string d ($1 \leq |d| \leq 3 \cdot 10^5$).

The last line contains a single integer n ($1 \leq n \leq 3 \cdot 10^5$).

Output

Output a single integer: the answer to the problem, modulo $10^9 + 7$.

Examples

input
A? ? 3
output
2

input
A B 10
output
2046

Note

For the first sample, there are four possible pairs of (c', d') .

If $(c', d') = (AA, A)$, then the flexibility is 0.

If $(c', d') = (AB, A)$, then the flexibility is 0.

If $(c', d') = (AA, B)$, then the flexibility is 2, as the pairs of binary strings $(1, 11)$, $(0, 00)$ are the only good pairs.

If $(c', d') = (AB, B)$, then the flexibility is 0.

Thus, the total flexibility is 2.

For the second sample, there are $2^1 + 2^2 + \dots + 2^{10} = 2046$ possible binary strings of length not greater than 10, and the set of pairs of good strings is precisely the set of pairs (s, s) , where s is a binary string of length not greater than 10.