Codeforces Round #325 (Div. 1)

A. Gennady the Dentist

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Gennady is one of the best child dentists in Berland. Today n children got an appointment with him, they lined up in front of his office.

All children love to cry loudly at the reception at the dentist. We enumerate the children with integers from 1 to n in the order they go in the line. Every child is associated with the value of his *cofidence* p_i. The children take turns one after another to come into the office; each time the child that is the first in the line goes to the doctor.

While Gennady treats the teeth of the i-th child, the child is crying with the volume of v_i. At that the *confidence* of the first child in the line is reduced by the amount of v_i, the second one — by value $v_i - 1$, and so on. The children in the queue after the v_i-th child almost do not hear the crying, so their *confidence* remains unchanged.

If at any point in time the *confidence* of the j-th child is less than zero, he begins to cry with the volume of d_j and leaves the line, running towards the exit, without going to the doctor's office. At this the *confidence* of all the children after the j-th one in the line is reduced by the amount of d_j.

All these events occur immediately one after the other in some order. Some cries may lead to other cries, causing a chain reaction. Once in the hallway it is quiet, the child, who is first in the line, goes into the doctor's office.

Help Gennady the Dentist to determine the numbers of kids, whose teeth he will cure. Print their numbers in the chronological order.

Input

The first line of the input contains a positive integer n ($1 \le n \le 4000$) — the number of kids in the line.

Next n lines contain three integers each v_i, d_i, p_i ($1 \le v_i, d_i, p_i \le 10^6$) — the volume of the cry in the doctor's office, the volume of the cry in the hall and the *confidence* of the i-th child.

Output

In the first line print number k — the number of children whose teeth Gennady will cure.

In the second line print k integers — the numbers of the children who will make it to the end of the line in the increasing order.

Examples

input
5 4 2 2 4 1 2 5 2 4 3 3 5 5 1 2
output
2 1 3

input
5 4 5 1 5 3 9 4 1 2 2 1 8 4 1 9
output
4 1 2 4 5

Note

In the first example, Gennady first treats the teeth of the first child who will cry with volume 4. The confidences of the remaining children will get equal to $-2, 1, 3, 1$, respectively. Thus, the second child also cries at the volume of 1 and run to the exit. The

confidence of the remaining children will be equal to $0, 2, 0$. Then the third child will go to the office, and cry with volume 5. The other children won't bear this, and with a loud cry they will run to the exit.

In the second sample, first the first child goes into the office, he will cry with volume 4. The confidence of the remaining children will be equal to $5, -1, 6, 8$. Thus, the third child will cry with the volume of 1 and run to the exit. The confidence of the remaining children will be equal to $5, 5, 7$. After that, the second child goes to the office and cry with the volume of 5. The confidences of the remaining children will be equal to $0, 3$. Then the fourth child will go into the office and cry with the volume of 2. Because of this the confidence of the fifth child will be 1, and he will go into the office last.

B. Phillip and Trains

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

The mobile application store has a new game called "Subway Roller".

The protagonist of the game Philip is located in one end of the tunnel and wants to get out of the other one. The tunnel is a rectangular field consisting of three rows and n columns. At the beginning of the game the hero is in some cell of the leftmost column. Some number of trains rides towards the hero. Each train consists of two or more neighbouring cells in some row of the field.

All trains are moving from right to left at a speed of two cells per second, and the hero runs from left to right at the speed of one cell per second. For simplicity, the game is implemented so that the hero and the trains move in turns. First, the hero moves one cell to the right, then one square up or down, or stays idle. Then all the trains move twice simultaneously one cell to the left. Thus, in one move, Philip definitely makes a move to the right and can move up or down. If at any point, Philip is in the same cell with a train, he loses. If the train reaches the left column, it continues to move as before, leaving the tunnel.

Your task is to answer the question whether there is a sequence of movements of Philip, such that he would be able to get to the rightmost column.

Input

Each test contains from one to ten sets of the input data. The first line of the test contains a single integer t ($1 \le t \le 10$ for pretests and tests or $t = 1$ for hacks; see the Notes section for details) — the number of sets.

Then follows the description of t sets of the input data.

The first line of the description of each set contains two integers n, k ($2 \le n \le 100, 1 \le k \le 26$) — the number of columns on the field and the number of trains. Each of the following three lines contains the sequence of n character, representing the row of the field where the game is on. Philip's initial position is marked as 's', he is in the leftmost column. Each of the k trains is marked by some sequence of identical uppercase letters of the English alphabet, located in one line. Distinct trains are represented by distinct letters. Character '.' represents an empty cell, that is, the cell that doesn't contain either Philip or the trains.

Output

For each set of the input data print on a single line word YES, if it is possible to win the game and word NO otherwise.

Examples

input
2 16 4 ...AAAAA........ s.BBB......CCCCC ....DDDDD... 16 4 ...AAAAA........ s.BBB....CCCCC.. ....DDDDD....

output
YES NO

input
2 10 4 s.ZZ...... .....AAABB .YYYYYY... 10 4 s.ZZ...... ....AAAABB .YYYYYY...

output
YES NO

Note

In the first set of the input of the first sample Philip must first go forward and go down to the third row of the field, then go only forward, then go forward and climb to the second row, go forward again and go up to the first row. After that way no train blocks Philip's path, so he can go straight to the end of the tunnel.

Note that in this problem the challenges are restricted to tests that contain only one testset.

C. Alice, Bob, Oranges and Apples

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Alice and Bob decided to eat some fruit. In the kitchen they found a large bag of oranges and apples. Alice immediately took an orange for herself, Bob took an apple. To make the process of sharing the remaining fruit more fun, the friends decided to play a game. They put multiple cards and on each one they wrote a letter, either 'A', or the letter 'B'. Then they began to remove the cards one by one from left to right, every time they removed a card with the letter 'A', Alice gave Bob all the fruits she had at that moment and took out of the bag as many apples and as many oranges as she had before. Thus the number of oranges and apples Alice had, did not change. If the card had written letter 'B', then Bob did the same, that is, he gave Alice all the fruit that he had, and took from the bag the same set of fruit. After the last card way removed, all the fruit in the bag were over.

You know how many oranges and apples was in the bag at first. Your task is to find any sequence of cards that Alice and Bob could have played with.

Input

The first line of the input contains two integers, x, y ($1 \le x, y \le 10^{18}, xy > 1$) — the number of oranges and apples that were initially in the bag.

Output

Print any sequence of cards that would meet the problem conditions as a *compressed* string of characters 'A' and 'B. That means that you need to replace the segments of identical consecutive characters by the number of repetitions of the characters and the actual character. For example, string AAABAABBB should be replaced by string 3A1B2A3B, but cannot be replaced by 2A1A1B2A3B or by 3AB2A3B. See the samples for clarifications of the output format. The string that you print should consist of at most 10^6 characters. It is guaranteed that if the answer exists, its compressed representation exists, consisting of at most 10^6 characters. If there are several possible answers, you are allowed to print any of them.

If the sequence of cards that meet the problem statement does not not exist, print a single word `Impossible`.

Examples

input
1 4
output
3B

input
2 2
output
Impossible

input
3 2
output
1A1B

Note

In the first sample, if the row contained three cards with letter 'B', then Bob should give one apple to Alice three times. So, in the end of the game Alice has one orange and three apples, and Bob has one apple, in total it is one orange and four apples.

In second sample, there is no answer since one card is not enough for game to finish, and two cards will produce at least three apples or three oranges.

In the third sample, cards contain letters 'AB', so after removing the first card Bob has one orange and one apple, and after removal of second card Alice has two oranges and one apple. So, in total it is three oranges and two apples.

D. Lizard Era: Beginning

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

In the game Lizard Era: Beginning the protagonist will travel with three companions: Lynn, Meliana and Worrigan. Overall the game has n mandatory quests. To perform each of them, you need to take **exactly two** companions.

The attitude of each of the companions to the hero is an integer. Initially, the attitude of each of them to the hero of neutral and equal to 0. As the hero completes quests, he makes actions that change the attitude of the companions, whom he took to perform this task, in positive or negative direction.

Tell us what companions the hero needs to choose to make their attitude equal after completing all the quests. If this can be done in several ways, choose the one in which the value of resulting attitude is greatest possible.

Input

The first line contains positive integer n ($1 \le n \le 25$) — the number of important tasks.

Next n lines contain the descriptions of the tasks — the i-th line contains three integers l_i, m_i, w_i — the values by which the attitude of Lynn, Meliana and Worrigan respectively will change towards the hero if the hero takes them on the i-th task. All the numbers in the input are integers and do not exceed 10^7 in absolute value.

Output

If there is no solution, print in the first line "`Impossible`".

Otherwise, print n lines, two characters is each line — in the i-th line print the first letters of the companions' names that hero should take to complete the i-th task ('`L`' for Lynn, '`M`' for Meliana, '`W`' for Worrigan). Print the letters in any order, if there are multiple solutions, print any of them.

Examples

input
3 1 0 0 0 1 0 0 0 1
output
LM MW MW

input
7 0 8 9 5 9 -2 6 -8 -7 9 4 5 -4 -9 9 -4 5 2 -6 8 -7
output
LM MW LM LW MW LM LW

input
2 1 0 0 1 1 0
output
Impossible

E. Present for Vitalik the Philatelist

time limit per test: 5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Vitalik the philatelist has a birthday today!

As he is a regular customer in a stamp store called 'Robin Bobin', the store management decided to make him a gift.

Vitalik wants to buy one stamp and the store will give him a non-empty set of the remaining stamps, such that the greatest common divisor (GCD) of the price of the stamps they give to him is more than one. If the GCD of prices of the purchased stamp and prices of present stamps set will be equal to 1, then Vitalik will leave the store completely happy.

The store management asks you to count the number of different situations in which Vitalik will leave the store completely happy. Since the required number of situations can be very large, you need to find the remainder of this number modulo $10^9 + 7$. The situations are different if the stamps purchased by Vitalik are different, or if one of the present sets contains a stamp that the other present does not contain.

Input

The first line of the input contains integer n ($2 \le n \le 5 \cdot 10^5$) — the number of distinct stamps, available for sale in the 'Robin Bobin' store.

The second line contains a sequence of integers $a_1, a_2, \ldots, a_n$ ($2 \le a_i \le 10^7$), where a_i is the price of the i-th stamp.

Output

Print a single integer — the remainder of the sought number of situations modulo $10^9 + 7$.

Examples

input
3 2 3 2
output
5

input
2 9 6
output
0

Note

In the first sample the following situations are possible:

- Vitalik buys the 1-st stamp, the store gives him the 2-nd stamp as a present;
- Vitalik buys the 3-rd stamp, the store gives him the 2-nd stamp as a present;
- Vitalik buys the 2-nd stamp, the store gives him the 1-st stamp as a present;
- Vitalik buys the 2-nd stamp, the store gives him the 3-rd stamp as a present;
- Vitalik buys the 2-nd stamp, the store gives him the 1-st and 3-rd stamps as a present.

F. Digits of Number Pi

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

Vasily has recently learned about the amazing properties of number π. In one of the articles it has been hypothesized that, whatever the sequence of numbers we have, in some position, this sequence is found among the digits of number π. Thus, if you take, for example, the epic novel "War and Peace" of famous Russian author Leo Tolstoy, and encode it with numbers, then we will find the novel among the characters of number π.

Vasily was absolutely delighted with this, because it means that all the books, songs and programs have already been written and encoded in the digits of π. Vasily is, of course, a bit wary that this is only a hypothesis and it hasn't been proved, so he decided to check it out.

To do this, Vasily downloaded from the Internet the archive with the sequence of digits of number π, starting with a certain position, and began to check the different strings of digits on the presence in the downloaded archive. Vasily quickly found short strings of digits, but each time he took a longer string, it turned out that it is not in the archive. Vasily came up with a definition that a string of length d is a *half-occurrence* if it contains a substring of length of at least $\lfloor \frac{d}{2} \rfloor$, which occurs in the archive.

To complete the investigation, Vasily took 2 large numbers x, y ($x \le y$) with the same number of digits and now he wants to find the number of numbers in the interval from x to y, which are *half-occurrences* in the archive. Help Vasily calculate this value modulo $10^9 + 7$.

Input

The first line contains string s consisting of decimal digits ($1 \le |s| \le 1000$) that Vasily will use to search substrings in. According to hypothesis, this sequence of digis indeed occurs in the decimal representation of π, although we can't guarantee that.

The second and third lines contain two positive integers x, y of the same length d ($x \le y$, $2 \le d \le 50$). Numbers x, y do not contain leading zeroes.

Output

Print how many numbers in the segment from x to y that are half-occurrences in s modulo $10^9 + 7$.

Examples

input
02 10 19
output
2

input
023456789 10 19
output
9

input
31415926535 10 29
output
20