A. The New Year

Limits: 1 sec., 256 MiB

The New Year is probably the most exciting and pleasant holiday in the year. Kids are waiting for the presents and it is well known that **Did Moroz** is the one to bring them.

Did Moroz has many different names. For example, in Turkey he is **Noel Baba**, in America — **Santa Claus**, in Finland — **Joulupukki** and in Italy his name is **Babbo Natale**.

During the year Did Moroz is preparing for the New Year night. Sometimes he has one day more for the preparation. This happens during the leap year. As you know a year is considered to be leap if it is divisible by 400 or if it is divisible by 4 and not divisible by 100.

Some time ago Did Moroz decided to calculate the number of leap years among the next N years. But he is quite an old guy and thus does not remember either when he has decided to calculate that or what the answer was. Your task is to find the minimal and maximal possible Did Moroz's answers.

Input

The only integer number N.

Output

Two integer numbers separated by a single space — the minimal and maximal possible Did Moroz's answers.

Constraints

$1 \le N \le 1000000000(10^9)$.

Samples

Input (*stdin*)	Output (*stdout*)
7	0 2

Notes

For example, from 1897 till 1903, inclusive, there was no leap year and from 2002 till 2008, inclusive, there were two of them.

B. The Bull's Year

Limits: 1 sec., 256 MiB

Once each twelve years the bull's year comes. In this year the intellectual abilities of bulls are activated, especially in the village with no name.

The bulls of the village with no name are considering the sequences of N positive integer numbers. The first element of each sequence should be equal to 1. Moreover the absolute value of the difference of two consecutive elements in the sequence should be equal to 1. Your task is to calculate the number of different such sequences.

Input

The only integer number N.

Output

Print a single integer — the number of different sequences the bulls are considering.

Constraints

$1 \leq N \leq 100000(10^5)$.

Samples

Input (*stdin*)	Output (*stdout*)
4	3

Notes

The bulls are considering the following sequences: (1, 2, 3, 4), (1, 2, 3, 2) and (1, 2, 1, 2).

C. The Holidays Are Coming

Limits: 1 sec., 256 MiB

We can often hear the saying "The holidays are coming", but have you ever thought about how are they coming? And here is the answer: they are coming with bag on the back and well known song in the air. Yes, it is Did Moroz coming to cheer up all the kids with some nice presents.

In the village with no name there is one long street with N houses. Did Moroz starts with the first house on the street and comes in every one until he visits all of them. Somewhere the distance between two neighboring houses is too long and Did Moroz has very boring way from one house to another. That's why the council of the village decided to build M new houses on the street in the way to minimize the longest distance between the neighboring houses. You have to find the longest distance between the neighboring houses after the new M houses will be built.

Input

The first line contains two integer numbers N and M separated by a single space. The next line contains $N - 1$ integer numbers d_i separated by single spaces. Here, d_i is a distance between the i-th and the $(i + 1)$-th houses on the street.

Output

Print the longest distance between the neighboring houses as an irreducible fraction in a/b form, where $0 \leq a$ and $0 < b$.

Constraints

$2 \leq N \leq 100000(10^5)$,
$1 \leq M \leq 100000(10^5)$,
$1 \leq d_i \leq 1000000000(10^9)$.

Samples

Input (*stdin*)	Output (*stdout*)
4 4 7 1 3	7/4

D. The Garlands

Limits: 1 sec., 256 MiB

The kids of the village with no name are constructing the garlands for the New Year tree. They are using colored lamps and wires to connect them. The kids have N boxes with lamps. Each box contains infinitely many identical lamps, but lamps from different boxes are always different. Each lamp has its color and size. There are four possible colors (red, green, blue and yellow). We will denote them with single characters R, G, B and Y, respectively. The size is a positive integer number. Thus each lamp could be represented in CS form, where C is the color and S is the size of the lamp. For example, G23 is the green lamp with the size of 23 and Y1 is the yellow lamp with the size of 1.

For each garland kids are using exactly one lamp from each box. The garland is the sequence of these lamps connected with a wire. The kids are constructing the garlands in such way that each two consecutive lamps in the garland have different sizes.

The kids have constructed all possible different such garlands in certain order. Among two possible garlands they have constructed first the garland with the bigger first lamp. In case of a tie they have chosen the one with red color of the first lamp, then — with green, then — with blue and finally — with yellow. If there was still a tie they have chosen the garland according to the second lamp and so on.

You have to determine the K-th garland constructed by the kids.

Input

The first line contains two integer numbers N and K separated by a single space. The following line contains N lamp descriptions C_iS_i separated by single spaces. Here, C_iS_i is the lamp taken from the i-th box.

Output

Print the description of the K-th constructed garland in the form CS-CS-...-CS (separated by minus signs). If there was less than K garlands constructed print NONE.

Constraints

$1 \le N \le 100$,
$1 \le K \le 1000000000(10^9)$,
C_i is either R or G or B or Y,
$1 \le S_i \le 1000000000(10^9)$,
$C_iS_i \ne C_jS_j$, for $i \ne j$.

Samples

Input (*stdin*)	Output (*stdout*)
4 4 B4 R7 B7 Y2	R7-Y2-B4-B7

Notes

The garlands have been constructed in the following order: R7-B4-B7-Y2, R7-B4-Y2-B7, R7-Y2-B7-B4, R7-Y2-B4-B7, ...

E. The New Year Presents

Limits: 1 sec., 256 MiB

Did Moroz is preparing his New Year present bags. He is quite old and tired, thus he has asked the kids of the village with no name to help him.

There are N bags (numbered from 1 to N) on the floor of the Did Moroz's house. Every time Did Moroz either gives a command for kids to execute or asks a question. In case of a command he specifies two bags A and B that are on the floor at the moment and kids should place the bag A into the bag B. In case of a question he specifies one bag C that is not necessary on the floor at the moment and kids should find out how many bags have to be opened to get the bag C out.

You have to give answers for every Did Moroz's question.

Input

The first line contains two integer numbers N and M separated by a single space. Here, M is the number of actions. Each of the following M lines contains either the command in a form `+ A B` or the question in the form `? C`.

Output

For each question print a line containing the number of bags that should be opened to get the desired bag out.

Constraints

$1 \le N, M \le 100000(10^5)$,
$1 \le A, B, C \le N$,
$A \ne B$,
before the action bags A and B are not inside some other bags.

Samples

Input (*stdin*)	Output (*stdout*)
9 5	0
? 7	2
+ 7 3	0
+ 3 5	
? 7	
? 4	

F. The New Year Globalization

Limits: 1 sec., 256 MiB

Just before the New Year the peasants of the village with no name are preparing for Did Moroz's visit. They have created a big board with a greeting message for him. But someone has mentioned that according to the globalization Did Moroz could be reading either in usual left-to-right way or in unusual right-to-left way and thus some misunderstanding might occur.

The kids have suggested the solution for the problem. The greeting message for the Did Moroz should be changed in such way that one could read it in the same way from the left to the right and from the right to the left.

There is not much time left, so everything the peasants could do now is to append characters at the beginning and at the end of the message. You have to determine the minimal number of characters that have to be added to achieve the goal.

Input

The greeting message S.

Output

Print a single integer number — the minimal required number of character.

Constraints

$1 \le |S| \le 100000(10^5)$,
S consists of only uppercase letters A–Z.

Samples

Input (*stdin*)	Output (*stdout*)
DIDPRYVIT	6

G. The Did Moroz's Lucky Numbers

Limits: 1 sec., 256 MiB

As you probably know the lucky number is a positive integer number that contains only 4 and 7 in its decimal notation. For example, numbers 47, 4 and 74774777 are lucky and 54, 1 and 10 are not.

Did Moroz would like to have more lucky numbers. He has his own set of the lucky numbers. The Did Moroz's lucky number is a positive integer number that is divisible by at least on lucky number. For example, 8, 42 and 94 are Did Moroz's lucky numbers.

You have to find the number of Did Moroz's lucky numbers that are not less than A and are not greater than B.

Input

Two integer numbers A and B separated by a single space.

Output

Print a single integer — the number of Did Moroz's lucky numbers between A and B, inclusive.

Constraints

$1 \le A \le B \le 1000000000(10^9)$.

Samples

Input (*stdin*)	Output (*stdout*)
1 100	39

Notes

The Did Moroz's lucky numbers on the interval $[1, 100]$ are: 4, 7, 8, 12, 14, 16, 20, 21, 24, 28, 32, 35, 36, 40, 42, 44, 47, 48, 49, 52, 56, 60, 63, 64, 68, 70, 72, 74, 76, 77, 80, 84, 88, 91, 92, 94, 96, 98, 100.