Information

Memory limit

The limit is 512 MiB for each problem.

Source code limit

The size of each solution source code can't exceed 256 KiB.

Submissions limit

You can submit at most 50 solutions for each problem.

You can submit a solution to each task at most once per 30 seconds. This restriction does not apply in the last 15 minutes of the contest round.

Scoring

Each problem consists of several subtasks. The subtask score is awarded if all tests in the subtask are passed.

The number of points scored for the problem is the total number of points scored on each of its subtasks. The score for the subtask is the maximum number of points earned for this subtask among all the solutions submitted.

Feedback

To get feedback for your solution, go to "Runs" tab in PCMS2 Web Client and use "View Feedback" link. In each problem of the contest you will see the score for each subtask, or the verdict for the first failed test.

Scoreboard

The contestants' scoreboard is available during the contest. Use "Monitor" link in PCMS2 Web Client to access the scoreboard. The standings provided in PCMS2 Web Client are not final.

Problem A. Cool Water

Time limit: 1 second
Memory limit: 512 megabytes

Tintin neither drinks tea, nor coffee. He drinks only pure water, moreover the temperature of water has to be exactly x°C, otherwise Tintin can get burned, or get cold. He was very glad, when he had discovered a water cooler with pure water. In the cooler manual it says that on pressing the red button the cooler pours a milliliters of 100°C water, and on pressing the blue button — b milliliters of 0°C water.

Tintin knows that mixing n milliliters of 100°C water and m milliliters of 0°C water result into $n + m$ milliliters of $\left(\frac{100n}{n+m}\right)^{\circ}$C water.

Tintin saves pure water, he wants to pour x°C water into his 1000-milliliter bottle, without wasting any water. What is the maximum volume of water in milliliters Tintin can pour into his bottle, by pressing red and blue buttons of the water cooler.

Input

The first line contains a single integer a ($1 \le a \le 1000$) — the volume of 100°C water in milliliters poured on pressing the red button.

The second line contains a single integer b ($1 \le b \le 1000$) — the volume of 0°C water in milliliters poured on pressing the red button.

The third line contains a single integer x ($0 \le x \le 100$) — the required temperature of water.

Output

Print single integer — the maximum volume of x°C water in milliliters that Tintin can pour.

Scoring

Testing data for this problem consists of 20 test cases. For solving each test case you are awarded 5 points. Total score is the total sum of points for all test cases. The testing result for each test case is shown.

Examples

standard input	standard output
10 20 30	1000
100 101 10	0
15 25 40	750

Explanations

In the first example Tintin can press the red button 30 times, and the blue one 35 times, then it fills his bottle with 1000 milliliters of 30°C water.

In the second example there is no way to get any water using only 1000-milliliter bottle.

In the third example Tintin can press the red button 20 times, and the blue one 18 times, then there are 750 milliliters of 40°C water in the bottle. Tintin can't get more 40°C water into his bottle.

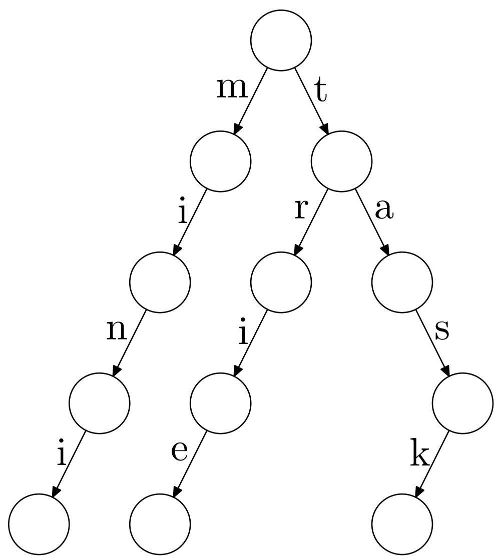
Problem B. Trie Minimization

Time limit:	1 second
Memory limit:	512 megabytes

Recently Innopolis University students have learnt data structures for searching strings, one of which was prefix tree or *trie*. Trie is a data structure that stores a set of strings as a rooted tree.

The tree has the following structure. Each edge of the tree is labeled with a single letter, there are no two edges labeled with the same letter that come out of each node. Each string can be read walking along some path from root to some vertex.

For instance, we can build a trie for strings "`min`", "`trie`", "`task`", and "`mini`", and it looks like this:



After the class professor gave the following homework: given a set of strings, your task is to replace some letters, so that the trie has the minimum number of nodes. What is the minimum number of replacements required for that? Students easily solved the task, can you do the same?

Input

The first line contains a single integer n ($1 \le n \le 100\,000$) — the number of strings in the given set.

The following n lines contain strings from the set. Strings consist of lowercase English letters, the length of each string doesn't exceed 100 000.

The total length of all strings in the set doesn't exceed 1 000 000.

Output

Print a single integer — the minimum number of replacements required to make a trie of minimum possible size.

Scoring

Subtask	Score	Constraints
1	12	$n = 2$
2	14	$n = 3$
3	15	string lengths are 2
4	24	strings consist of letters '`a`' and '`b`'
5	35	no additional constraint

Example

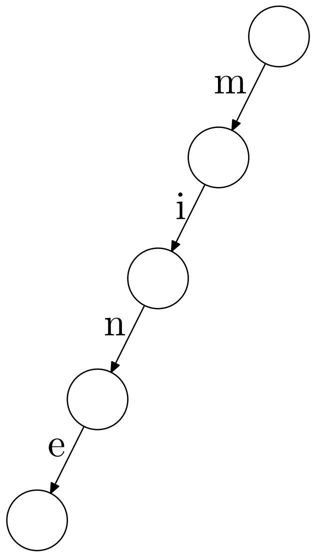
standard input	standard output
4 min trie task mini	8

Explanation

In the given example one of the ways to solve the task is to make three replacements in "`trie`" and get "`mine`", in "`task`" make four replacements and get "`mine`", and in "`mini`" make one replacement and get "`mine`". The total number of replacements done is 8.

This results in set: "`min`", "`mine`", "`mine`", and "`mine`".

The trie built for this set is on the picture, it consists of 5 nodes.



Problem C. Painting Plan

Time limit: 2 seconds
Memory limit: 512 megabytes

In Innopolis, construction and modernization continues. Recently, they started to use the new automatic painting system for fences.

As initial data, the system was given a set of segments $[l_i, r_i]$, which should be painted, these segments could intersect. The system analyzed the data, and calculated that the total length of the fence that should be painted is k meters (if the section of the fence belongs to several segments, it still needs to be painted only once).

Unfortunately, due to an error in the program, during the data analysis, the file with the source data was corrupted. Namely, the system took all the numbers l_i and r_i, put them in the same array x_i, and sorted it in ascending order, losing the original order, as well as information about which number is the left and which is the right border of a segment.

You need to try to restore the original segments by the number k and the set of numbers x_i, or say that the system failed and this is impossible.

Input

The first line contains two integers n and k ($1 \le n \le 7000$; $0 \le k \le 30\,000$), the number of segments and the total length of the painted part of the fence, respectively.

The second line contains $2 \cdot n$ integers $x_1, x_2, \ldots, x_{2n}$ ($0 \le x_i \le 30\,000$), the coordinates of the ends of the segments in sorted order. It is guaranteed, that all coordinates are different.

Output

If the correct plan does not exist, then in the first line output the word "`No`" .

Otherwise, in the first line output the word "`Yes`".

In the next n lines print two numbers each, the indices in the array x_i corresponding to the left and right border of the next segment. The indices are numbered from 1.

If there are several correct answers, print any.

Scoring

Subtask	Points	Constraints
1	7	$x_i = i - 1$
2	11	$x_i - x_{i-1} = x_2 - x_1$ and $x_1 = 0$
3	22	$n \le 100$; $k, x_i \le 1000$
4	26	$n \le 1000$; $k, x_i \le 5000$
5	34	no additional constraint

Examples

standard input	standard output
4 9 0 1 3 5 8 9 10 12	Yes 4 5 1 2 3 6 7 8
3 2 1 2 3 4 5 6	No

Explanations

In the first example, the plan contains the following segments: $[5, 8]$, $[0, 1]$, $[3, 9]$, and $[10, 12]$. The total length of the painted part of the fence is 9.

In the second example, there is no configuration of segments with given ends, at which the total length of the painted part will be equal to 2.

Problem D. Subset "AND"

Time limit: 3 seconds
Memory limit: 512 megabytes

You are given two integers k and s. Build a set of s-bit numbers from 0 to $2^s - 1$, such that the number of different values among bitwise "AND"'s of all numbers in all non-empty subsets of your set is exactly k.

A bitwise "AND" is an operation applied to two or more numbers. Consider two integers a and b in binary: $a = \overline{a_{s-1}a_{s-2}\ldots a_1 a_0}$, $b = \overline{b_{s-1}b_{s-2}\ldots b_1 b_0}$ (we can assume that both a and b have exactly s bits, maybe with leading zeros). The result of bitwise "AND" of these two integers is a s-bit integer $c = a\&b = \overline{c_{s-1}c_{s-2}\ldots c_1 c_0}$, where c_i is equal to 1, if $a_i = 1$ and $b_i = 1$, and 0, if at least one of a_i or b_i is 0. For example, the bitwise "AND" of 29 (11101_2) and 11 (01011_2) is equal to 9 (01001_2).

In case of more than two numbers, the result of the bitwise "AND" is calculated by subsequently applying the bitwise "AND" to the first and the second number, then to the result of the first "AND" and the third number, and so on. If the subset only contains one number, then the result is that number.

Input

The only line in the input contains two integers k and s ($k \geq 1$) — the required number of different "AND" values and the number of bits you can use for your numbers.

Output

The first line should contains the number n ($1 \leq n \leq 125$) — the size of your set. The second line should contains the numbers in your set, separated by spaces. All numbers must be between 0 and $2^s - 1$ inclusive. It's guaranteed that an answer exists for all given input data.

Scoring

Subtask	Score	Constraints
1	7	$s = 10,\ k \leq 10$
2	10	$s = 30,\ k \leq 2^7$
3	11	$s = 60,\ k \leq 2^{10}$
4	11	$s = 60,\ k \leq 2^{15}$
5	12	$s = 60,\ k \leq 2^{18}$
6	16	$s = 60,\ k \leq 2^{19}$
7	10	$s = 60,\ k \leq 2^{20}$
8	8	$s = 50,\ k \leq 2^{20}$
9	15	$s = 40,\ k \leq 2^{20}$

Example

standard input	standard output
6 10	3 9 6 10

Explanation

Numbers in the example output are $9 = 1001_2$, $6 = 0110_2$, $10 = 1010_2$. There are six different "AND" values for all subsets of these three numbers: 9, 6, 10, $8 = 9\ \&\ 10$, $2 = 10\ \&\ 6$, $0 = 9\ \&\ 6 = 9\ \&\ 6\ \&\ 10$.

Problem E. Stamp

Time limit: 1 second
Memory limit: 512 megabytes

Designer Arseny wants to draw a new brilliant logo. For a special conceptuality, Arseny decided that he would use a special stamp for his drawing. A stamp is a rectangle $h \times w$, each cell of which is either empty or filled with a coloring element. When the stamp touches the paper, each coloring element fills the cell over which it is located. For aesthetic reasons, you cannot rotate the stamp.

Arseny wants the logo to be a rectangle completely filled with paint, but Arseniy has not yet determined the optimal dimensions of the rectangle. First, he wants to find the rectangle of the minimum area that can be obtained. Help him find such a rectangle.

Input

The first line contains the integers h and w ($1 \le h, w \le 3000$) — the height and width of the stamp.

The following h lines of w characters contain a description of the stamp, the character '`.`' corresponds to an empty cell, the character '`X`' corresponds to a cell with a coloring element.

It is guaranteed that the corner cells of the stamp are nonempty.

Output

Print two integers — the height and width of the rectangle of the minimum area, which can be obtained using this stamp.

Scoring

Subtask	Score	Constraints
1	16	$h, w \le 10$
2	17	$h, w \le 100$
3	28	$h, w \le 500$
4	19	$h, w \le 1000$
5	20	$h, w \le 3000$

Examples

standard input	standard output
4 3 X.X XXX ... X.X	5 4
5 6 X...XX XX...X ....XX.. XXX..X	7 9
1 1 X	1 1

Explanation

Illustration for the first example.