Problem A. Rook

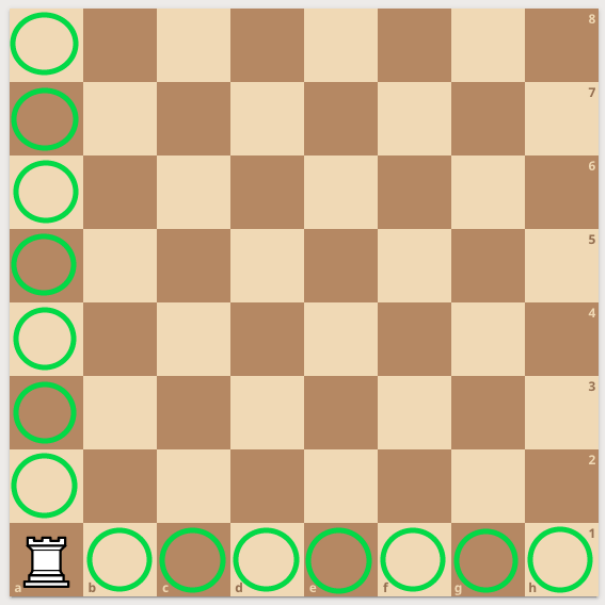
Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Given a chessboard of size $n \times m$. That is, with n rows and m columns.

On this chessboard, there is only one piece — the rook. It is located in the bottom left corner. There are no other pieces.

Recall that the rook can move any positive number of squares horizontally or vertically in one move, but not diagonally.

Find the number of squares to which the rook can move in exactly one move.



The picture shows a traditional chessboard of size 8×8. On it, the rook can move to all the squares marked in green. There are a total of 14 such squares, so the answer is 14.

Input

The first line contains one integer n ($1 \le n \le 20$).

The second line contains one integer m ($1 \le m \le 20$).

Output

Output the number of squares to which the rook can move in one move.

Examples

standard input	standard output
8 8	14
3 2	3

Note

An explanation of why the answer is 14 for the first example can be seen in the picture above.

In the second example, the answer is 3, because the rook can only move to one position to the right and two positions up.

Problem B. Arithmetic Mean

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Kozak Vus has two numbers a and b ($a \le b$). He found the arithmetic mean of these numbers (let's call it c). That is, $c = \frac{a+b}{2}$.

You are given the number a (the smaller of the two numbers), as well as the number c. Find b.

Input

The first line contains one integer a ($1 \le a \le 100$).

The second line contains one integer c ($a \le c \le 100$).

Output

Output one integer — b.

Example

standard input	standard output
3 7	11

Problem C. Chocolate Bar

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Sakurako was walking with her dog Martel. They found a chocolate bar divided into $n \cdot m$ squares with n rows and m columns. More formally, the chocolate bar can be represented as a rectangle with lines passing through only integer points and lines parallel to the coordinate axes.

Since Sakurako believes that they both found the chocolate bar, they need to divide it. Sakurako should receive x squares and Martel y squares. At the same time, they need to make **at most one** cut of the chocolate bar, as otherwise, it will be inconvenient to carry it. Also, the chocolate bar can be cut **only by straight lines without cutting the squares into pieces.** Help Sakurako determine whether it is possible to cut the chocolate bar in this way.

Input

First line contains two integers n and m ($1 \le n, m \le 10^9$).

Second line contains two integers x and y ($1 \le x, y \le 10^{18}$).

Output

Output "`Yes`" if it is possible to divide it in this way, or "`No`" otherwise.

Note that it is recommended to use 64-bit integers (for example, `long long` in C++).

Scoring

In this problem, there are conditional blocks. If your solution works correctly for certain constraints, it will receive a certain number of points. Note that testing is going test by test, but not by blocks.

1. (40 points): $n, m \le 10^5$;
2. (60 points): without additional constraints.

Examples

standard input	standard output
2 3 2 4	Yes
3 4 6 6	Yes
4 4 6 10	No

Note

In the first example, you can cut the chocolate of size 2×3 using one cut into 2×1 and 2×2 pieces. This would satisfy the requirements of both Sakurako and Martel (since Sakurako wants 2 squares and Martel wants 4 and $2 = 2 \times 1$, $4 = 2 \times 2$).

In the second example, they can cut chocolate 3×4 into 2 chocolates with 3×2 squares each. This satisfies the requirements.

We can prove that there is no way of satisfying our constraints in the third test.

Problem D. Sakurako's Pet

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Today, Sakurako was playing with her dog. Its name is Martel, and since he is very smart, he plays only in math games. Martel chose two numbers n and x and gave them to Sakurako.

In one turn, she can change n to one of the following numbers:

- $n := \lfloor\sqrt{n}\rfloor$.
- $n := \lceil\sqrt{n}\rceil$.

Martel asks if she can get x from n, by using either one of these operations any number of times and if yes, what is the sequence of operations. Since Martel comes up with numbers really fast, Sakurako doesn't have enough time to solve the task, so she asks you for help.

$\lfloor n\rfloor$ is the biggest integer that is at most n. For example, $\lfloor 4.3\rfloor = 4$; $\lfloor 4\rfloor$ is also 4.

$\lceil n\rceil$ is the smallest integer that is at least n. For example, $\lceil 4.3\rceil = 5$; $\lceil 5\rceil$ is also 5.

Input

The first line contains two integers n and x ($1 \le x \le n \le 10^{18}$) — two numbers that Martel chose.

Note that it is recommended to use 64-bit integers (for example, `long long` in C++).

Output

In the first line, output "`Yes`" if it is possible to get from n to x by some number of operations and "`No`" otherwise.

If it is possible to do so, in the next line output a single integer k ($0 \le k \le 500$) — the number of operations you need to get x. Note, there is no need to minimize k.

In the third line, output k characters 0 or 1 where 0 means to use operation $\lfloor\sqrt{n}\rfloor$ and 1 means to use $\lceil\sqrt{n}\rceil$ operation.

Notice that there may be many possible answers; you are allowed to output an arbitrary one that meets the conditions described in the statement.

Scoring

In this task, each test is scored individually.

In order to get full points, you are supposed to give out the exact way of getting from n to x.

To get 50% of points if the answer is "`Yes`", you need either output $k = -1$ and nothing after this, or output k and any k operations.

Examples

standard input	standard output
9 2	Yes 2 01
9 6	No

Note

In the first test, we can use the following list of operations $9 \to \lfloor\sqrt{9}\rfloor = 3 \to \lceil\sqrt{3}\rceil = 2$.

We can show that there is no way of getting 6 from 9 in the second example.

Problem E. Bug

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

While Sakurako was watching a video on the Internet about her favorite game, she found a bug which was as follows:

You have some number of money, displayed as a number in some rectangle. The rectangle has length n pixels, and Sakurako knows the length of each digit (for example, 1 may take 1 pixel, so it will take 1 pixel in the rectangle), and between any two digits in the number, there is one pixel (for example, if 1 takes 1 pixel then 11 takes 3, since 1 per each digit and 1 between them). If the length of the number is bigger than n, then she gets infinite money.

Sakurako knows that she can get at most m money, so she asks you if it is possible that she can perform the bug. More formally, if there is a number x such that $x \le m$ and the length of x is bigger than n.

Input

The first line contains 10 integers $a_0, a_1, \ldots, a_9$ ($1 \le a_i \le 20$) — a_i is the length of the digit i.

The second line contains two integers n and m ($1 \le n \le 360, 1 \le m \le 10^{18}$) — length of the rectangle and maximum amount of money Sakurako can get.

Output

Output "`Yes`" if Sakurako can perform the bug, and "`No`" otherwise. If your answer is "`Yes`", you should output a valid answer in the next line.

If there are multiple correct answers, you are allowed to print any of them.

Scoring

In this problem, there are conditional blocks. If your solution works correctly for certain constraints, it will receive a certain number of points. Note that testing is going test by test, but not by blocks.

1. (20 points): $a_i = 1$ for all $0 \le i \le 9$;
2. (24 points): $m \le 10^5$;
3. (56 points): without additional constraints.

Examples

standard input	standard output
1 1 1 1 1 1 1 1 1 1 9 100000	YES 100000
1 2 3 4 5 6 7 8 9 10 36 100000	YES 99999

Note

In the first example, the total length of number 100000 in pixels is equal to $1+1+1+1+1+1+1+1+1+1+1 = 11$ pixels.

In the second example, the total length of number 99999 in pixels is equal to $10+1+10+1+10+1+10+1+10 = 54$ pixels.

Problem F. Sakurako and an Impossible Task

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Sakurako aced her tests and is now ready for everything. You are not so sure about that. That is why you gave her a task:

You are given a matrix a of size $n \times m$ with integer numbers in it. You have to find the biggest rectangular submatrix of A such that all numbers of that submatrix are in the range $[l, r]$.

Sakurako struggled a lot but could not solve this task. She thinks that you gave her an impossible task. Now you are supposed to solve this task to prove her wrong.

Input

The first line consists of four integers n, m, l, r ($1 \le n, m, \le 9 \cdot 10^6$; $n \cdot m \le 9 \cdot 10^6$; $0 \le l \le r \le 10^9$).

Each of the next n lines contains m integer numbers denoting elements of matrix a ($0 \le a_{i,j} \le 10^9$)

Output

Output a single number: the area of the biggest rectangular submatrix in which every number is in the range $[l, r]$.

Scoring

In this problem, there are conditional blocks. If your solution works correctly for certain constraints, it will receive a certain number of points. Note that testing is going test by test, but not by blocks.

- (20 points): $n, m \le 80$;
- (10 points): $\min(n, m) = 1$;
- (10 points): $\min(n, m) \le 10$;
- (60 points): without additional constraints.

Examples

standard input	standard output
4 5 0 0 1 0 0 0 1 1 0 1 0 1 1 0 0 1 0 1 0 0 1 1	4
8 8 0 1 0 0 0 0 2 1 0 0 0 0 0 0 1 2 0 0 1 2 2 0 2 0 0 0 0 0 0 2 1 0 0 2 0 0 0 1 2 0 0 0 0 0 0 2 2 4 3 1 1 2 1 2 2 2 2 2 0 0 1 0 0 1 1 0	9

Note

In the first test, the best choice would be to choose a rectangular submatrix which contains elements $a_{4,2}, a_{4,3}, a_{5,2}, a_{5,3}$.