A. Cloning Toys

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

Imp likes his plush toy a lot.

Recently, he found a machine that can clone plush toys. Imp knows that if he applies the machine to an original toy, he additionally gets one more original toy and one copy, and if he applies the machine to a copied toy, he gets two additional copies.

Initially, Imp has only one original toy. He wants to know if it is possible to use machine to get exactly x **copied** toys and y **original** toys? He can't throw toys away, and he can't apply the machine to a copy if he doesn't currently have any copies.

Input

The only line contains two integers x and y $(0 \le x, y \le 10^9)$ — the number of copies and the number of original toys Imp wants to get (including the initial one).

Output

Print "`Yes`", if the desired configuration is possible, and "`No`" otherwise.

You can print each letter in arbitrary case (upper or lower).

Examples

input
```
6 3
```
output
```
Yes
```

input
```
4 2
```
output
```
No
```

input
```
1000 1001
```
output
```
Yes
```

Note

In the first example, Imp has to apply the machine twice to original toys and then twice to copies.

B. Magic Forest

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

Imp is in a magic forest, where xorangles grow (wut?)

A xorangle of order n is such a non-degenerate triangle, that lengths of its sides are integers not exceeding n, and the xor-sum of the lengths is equal to zero. Imp has to count the number of distinct xorangles of order n to get out of the forest.

Formally, for a given integer n you have to find the number of such triples (a, b, c), that:

- $1 \le a \le b \le c \le n$;
- $a \oplus b \oplus c = 0$, where $x \oplus y$ denotes the bitwise xor of integers x and y.
- (a, b, c) form a non-degenerate (with strictly positive area) triangle.

Input
The only line contains a single integer n $(1 \le n \le 2500)$.

Output
Print the number of xorangles of order n.

Examples

input
6
output
1

input
10
output
2

Note
The only xorangle in the first sample is $(3, 5, 6)$.

C. Cave Painting

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

Imp is watching a documentary about cave painting.

Some numbers, carved in chaotic order, immediately attracted his attention. Imp rapidly proposed a guess that they are the remainders of division of a number n by all integers i from 1 to k. Unfortunately, there are too many integers to analyze for Imp.

Imp wants you to check whether all these remainders are distinct. Formally, he wants to check, if all $n \bmod i$, $1 \le i \le k$, are distinct, i. e. there is no such pair (i, j) that:

- $1 \le i < j \le k$,
- $n \bmod i = n \bmod j$, where $x \bmod y$ is the remainder of division x by y.

Input
The only line contains two integers n, k $(1 \le n, k \le 10^{18})$.

Output
Print "Yes", if all the remainders are distinct, and "No" otherwise.

You can print each letter in arbitrary case (lower or upper).

Examples

input

```
4 4
```

output

```
No
```

input

```
5 3
```

output

```
Yes
```

Note

In the first sample remainders modulo 1 and 4 coincide.

D. Robot Vacuum Cleaner

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

Pushok the dog has been chasing Imp for a few hours already.

Fortunately, Imp knows that Pushok is afraid of a robot vacuum cleaner.

While moving, the robot generates a string t consisting of letters 's' and 'h', that produces a lot of noise. We define *noise* of string t as the number of occurrences of string "sh" as a **subsequence** in it, in other words, the number of such pairs (i, j), that $i < j$ and $t_i = \mathrm{s}$ and $t_j = \mathrm{h}$.

The robot is off at the moment. Imp knows that it has a sequence of strings t_i in its memory, and he can arbitrary change their order. When the robot is started, it generates the string t as a concatenation of these strings in the given order. The noise of the resulting string equals the noise of this concatenation.

Help Imp to find the maximum noise he can achieve by changing the order of the strings.

Input

The first line contains a single integer n $(1 \le n \le 10^5)$ — the number of strings in robot's memory.

Next n lines contain the strings $t_1, t_2, \ldots, t_n$, one per line. It is guaranteed that the strings are non-empty, contain only English letters 's' and 'h' and their total length does not exceed 10^5.

Output

Print a single integer — the maxumum possible *noise* Imp can achieve by changing the order of the strings.

Examples

input

```
4
ssh
hs
s
hhhs
```

output

```
18
```

input

```
2
h
s
```

output

```
1
```

Note

The optimal concatenation in the first sample is $ssshhshhhs$.

E. Birds

time limit per test: 1 second

memory limit per test: 256 megabytes
input: standard input
output: standard output

Apart from plush toys, Imp is a huge fan of little yellow birds!

To summon birds, Imp needs strong magic. There are n trees in a row on an alley in a park, there is a nest on each of the trees. In the i-th nest there are c_i birds; to summon one bird from this nest Imp needs to stay under this tree and it costs him $cost_i$ points of mana. However, for each bird summoned, Imp increases his mana capacity by B points. Imp summons birds one by one, he can summon any number from 0 to c_i birds from the i-th nest.

Initially Imp stands under the first tree and has W points of mana, and his mana capacity equals W as well. He can only go forward, and each time he moves from a tree to the next one, he restores X points of mana (but it can't exceed his current mana capacity). Moving only forward, what is the maximum number of birds Imp can summon?

Input

The first line contains four integers n, W, B, X $(1 \le n \le 10^3, 0 \le W, B, X \le 10^9)$ — the number of trees, the initial points of mana, the number of points the mana capacity increases after a bird is summoned, and the number of points restored when Imp moves from a tree to the next one.

The second line contains n integers $c_1, c_2, \ldots, c_n$ $(0 \le c_i \le 10^4)$ — where c_i is the number of birds living in the i-th nest. It is guaranteed that $\sum_{i=1}^{n} c_i \le 10^4$.

The third line contains n integers $cost_1, cost_2, \ldots, cost_n$ $(0 \le cost_i \le 10^9)$, where $cost_i$ is the mana cost to summon a bird from the i-th nest.

Output

Print a single integer — the maximum number of birds Imp can summon.

Examples

input

```
2 12 0 4
3 4
4 2
```

output

```
6
```

input

```
4 1000 10 35
1 2 4 5
1000 500 250 200
```

output

```
5
```

input

```
2 10 7 11
2 10
6 1
```

output

```
11
```

Note

In the first sample base amount of Imp's mana is equal to 12 (with maximum capacity also equal to 12). After he summons two birds from the first nest, he loses 8 mana points, although his maximum capacity will not increase (since $B = 0$). After this step his mana will be 4 of 12; during the move you will replenish 4 mana points, and hence own 8 mana out of 12 possible. Now it's optimal to take 4 birds from the second nest and spend 8 mana. The final answer will be — 6.

In the second sample the base amount of mana is equal to 1000. The right choice will be to simply pick all birds from the last nest. Note that Imp's mana doesn't restore while moving because it's initially full.

F. Divisibility

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

Imp is really pleased that you helped him. But it you solve the last problem, his gladness would raise even more.

Let's define $f(\mathrm{I})$ for some set of integers I as the number of pairs a, b in I, such that:

- a is **strictly less** than b;
- a **divides** b without a remainder.

You are to find such a set I, which is a subset of $\{1, 2, ..., n\}$ (the set that contains all positive integers not greater than n), that $f(\mathrm{I}) = k$.

Input

The only line contains two integers n and k $(2 \le n \le 3 \cdot 10^5, 1 \le k \le \min(10^9, \frac{n \cdot (n-1)}{2}))$.

Output

If there is no answer, print "`No`".

Otherwise, in the first line print "`Yes`", in the second — an integer m that denotes the size of the set I you have found, in the second line print m integers — the elements of the set I, in any order.

If there are multiple answers, print any of them.

Examples

input
```
3 3
```
output
```
No
```

input
```
6 6
```
output
```
Yes
5
1 2 4 5 6
```

input
```
8 3
```
output
```
Yes
4
2 4 5 8
```

Note

In the second sample, the valid pairs in the output set are $(1, 2)$, $(1, 4)$, $(1, 5)$, $(1, 6)$, $(2, 4)$, $(2, 6)$. Thus, $f(\{1, 2, 4, 5, 6\}) = 6$.

In the third example, the valid pairs in the output set are $(2, 4)$, $(4, 8)$, $(2, 8)$. Thus, $f(\{2, 4, 5, 8\}) = 3$.