Codeforces Round #358 (Div. 2)

A. Alyona and Numbers

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

After finishing eating her bun, Alyona came up with two integers n and m. She decided to write down two columns of integers — the first column containing integers from 1 to n and the second containing integers from 1 to m. Now the girl wants to count how many pairs of integers she can choose, one from the first column and the other from the second column, such that their sum is divisible by 5.

Formally, Alyona wants to count the number of pairs of integers (x, y) such that $1 \le x \le n$, $1 \le y \le m$ and equals 0.

As usual, Alyona has some troubles and asks you to help.

Input
The only line of the input contains two integers n and m ($1 \le n, m \le 1\,000\,000$).

Output
Print the only integer — the number of pairs of integers (x, y) such that $1 \le x \le n$, $1 \le y \le m$ and $(x + y)$ is divisible by 5.

Examples

input
6 12
output
14

input
11 14
output
31

input
1 5
output
1

input
3 8
output
5

input
5 7
output
7

input
21 21
output
88

Note
Following pairs are suitable in the first sample case:

- for $x = 1$ fits y equal to 4 or 9;
- for $x = 2$ fits y equal to 3 or 8;
- for $x = 3$ fits y equal to 2, 7 or 12;

- for $x = 4$ fits y equal to $1, 6$ or 11;
- for $x = 5$ fits y equal to 5 or 10;
- for $x = 6$ fits y equal to 4 or 9.

Only the pair $(1, 4)$ is suitable in the third sample case.

B. Alyona and Mex

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

Someone gave Alyona an array containing n positive integers $a_1, a_2, ..., a_n$. In one operation, Alyona can choose any element of the array and decrease it, i.e. replace with any positive integer that is smaller than the current one. Alyona can repeat this operation as many times as she wants. In particular, she may not apply any operation to the array at all.

Formally, after applying some operations Alyona will get an array of n positive integers $b_1, b_2, ..., b_n$ such that $1 \le b_i \le a_i$ for every $1 \le i \le n$. Your task is to determine the maximum possible value of mex of this array.

Mex of an array in this problem is the **minimum positive** integer that doesn't appear in this array. For example, mex of the array containing 1, 3 and 4 is equal to 2, while mex of the array containing 2, 3 and 2 is equal to 1.

Input

The first line of the input contains a single integer n ($1 \le n \le 100\,000$) — the number of elements in the Alyona's array.

The second line of the input contains n integers $a_1, a_2, ..., a_n$ ($1 \le a_i \le 10^9$) — the elements of the array.

Output

Print one positive integer — the maximum possible value of mex of the array after Alyona applies some (possibly none) operations.

Examples

input
5 1 3 3 3 6
output
5

input
2 2 1
output
3

Note

In the first sample case if one will decrease the second element value to 2 and the fifth element value to 4 then the *mex* value of resulting array $1\ 2\ 3\ 3\ 4$ will be equal to 5.

To reach the answer to the second sample case one must not decrease any of the array elements.

C. Alyona and the Tree

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

Alyona decided to go on a diet and went to the forest to get some apples. There she unexpectedly found a magic rooted tree with root in the vertex 1, every vertex and every edge of which has a number written on.

The girl noticed that some of the tree's vertices are *sad*, so she decided to play with them. Let's call vertex v *sad* if there is a vertex u in subtree of vertex v such that $dist(v, u) > a_u$, where a_u is the number written on vertex u, $dist(v, u)$ is the sum of the numbers written on the edges on the path from v to u.

Leaves of a tree are vertices connected to a single vertex by a single edge, but the root of a tree is a *leaf* if and only if the tree consists of a single vertex — root.

Thus Alyona decided to remove some of tree leaves until there will be no any sad vertex left in the tree. What is the minimum number of leaves Alyona needs to remove?

Input

In the first line of the input integer n ($1 \le n \le 10^5$) is given — the number of vertices in the tree.

In the second line the sequence of n integers $a_1, a_2, ..., a_n$ ($1 \le a_i \le 10^9$) is given, where a_i is the number written on vertex i.

The next n - 1 lines describe tree edges: i^{th} of them consists of two integers p_i and c_i ($1 \le p_i \le n$, $-10^9 \le c_i \le 10^9$), meaning that there is an edge connecting vertices $i + 1$ and p_i with number c_i written on it.

Output

Print the only integer — the minimum number of leaves Alyona needs to remove such that there will be no any sad vertex left in the tree.

Example

input

```
9
88 22 83 14 95 91 98 53 11
3 24
7 -8
1 67
1 64
9 65
5 12
6 -80
3 8
```

output

```
5
```

Note

The following image represents possible process of removing leaves from the tree:

D. Alyona and Strings

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

After returned from forest, Alyona started reading a book. She noticed strings s and t, lengths of which are n and m respectively. As usual, reading bored Alyona and she decided to pay her attention to strings s and t, which she considered very similar.

Alyona has her favourite positive integer k and because she is too small, k does not exceed 10. The girl wants now to choose k disjoint non-empty substrings of string s such that these strings appear as disjoint substrings of string t and in the same order as they do in string s. She is also interested in that their length is maximum possible among all variants.

Formally, Alyona wants to find a sequence of k non-empty strings $p_1, p_2, p_3, ..., p_k$ satisfying following conditions:

- s can be represented as concatenation $a_1 p_1 a_2 p_2 ... a_k p_k a_{k+1}$, where $a_1, a_2, ..., a_{k+1}$ is a sequence of arbitrary strings (some of them may be possibly empty);
- t can be represented as concatenation $b_1 p_1 b_2 p_2 ... b_k p_k b_{k+1}$, where $b_1, b_2, ..., b_{k+1}$ is a sequence of arbitrary strings (some of them may be possibly empty);
- sum of the lengths of strings in sequence is maximum possible.

Please help Alyona solve this complicated problem and find at least the sum of the lengths of the strings in a desired sequence.

A *substring* of a string is a subsequence of consecutive characters of the string.

Input

In the first line of the input three integers n, m, k ($1 \le n, m \le 1000$, $1 \le k \le 10$) are given — the length of the string s, the length of the string t and Alyona's favourite number respectively.

The second line of the input contains string s, consisting of lowercase English letters.

The third line of the input contains string t, consisting of lowercase English letters.

Output

In the only line print the only non-negative integer — the sum of the lengths of the strings in a desired sequence.

It is guaranteed, that at least one desired sequence exists.

Examples

input
3 2 2 abc ab
output
2

input
9 12 4 bbaaababb abbbabbaaaba
output
7

Note

The following image describes the answer for the second sample case:

E. Alyona and Triangles

time limit per test: 3 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given n points with integer coordinates on the plane. Points are given in a way such that there is no triangle, formed by any three of these n points, which area exceeds S.

Alyona tried to construct a triangle with integer coordinates, which contains all n points and which area doesn't exceed $4S$, but, by obvious reason, had no success in that. Please help Alyona construct such triangle. Please note that vertices of resulting triangle are not necessarily chosen from n given points.

Input

In the first line of the input two integers n and S ($3 \le n \le 5000$, $1 \le S \le 10^{18}$) are given — the number of points given and the upper bound value of any triangle's area, formed by any three of given n points.

The next n lines describes given points: i^{th} of them consists of two integers x_i and y_i ($-10^8 \le x_i, y_i \le 10^8$) — coordinates of i^{th} point.

It is guaranteed that there is at least one triple of points not lying on the same line.

Output

Print the coordinates of three points — vertices of a triangle which contains all n points and which area doesn't exceed $4S$.

Coordinates of every triangle's vertex should be printed on a separate line, every coordinate pair should be separated by a single space. Coordinates should be an integers not exceeding 10^9 by absolute value.

It is guaranteed that there is at least one desired triangle. If there is more than one answer, print any of them.

Example

input
4 1 0 0 1 0 0 1 1 1
output
-1 0 2 0 0 2

Note

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