A - Adjacent Product

Time Limit: 2 sec / Memory Limit: 1024 MB

Score: 100 points

Problem Statement

You are given N integers $A_1, A_2, \ldots, A_N$. Also, define $B_i = A_i \times A_{i+1}$ $(1 \leq i \leq N-1)$.

Print $B_1, B_2, \ldots, B_{N-1}$ in this order, separated by spaces.

Constraints

- $2 \leq N \leq 100$
- $1 \leq A_i \leq 100$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

N
$A_1 \quad A_2 \quad \ldots \quad A_N$

Output

Print $B_1, B_2, \ldots, B_{N-1}$ in this order, separated by spaces.

Sample Input 1

```
3
3 4 6
```

Sample Output 1

```
12 24
```

We have $B_1 = A_1 \times A_2 = 12, B_2 = A_2 \times A_3 = 24$.

Sample Input 2

```
5
22 75 26 45 72
```

Sample Output 2

```
1650 1950 1170 3240
```

B - Piano

Time Limit: 2 sec / Memory Limit: 1024 MB

Score: 200 points

Problem Statement

There is an infinitely long piano keyboard. Is there a continuous segment within this keyboard that consists of W white keys and B black keys?

Let S be the string formed by infinitely repeating the string `wbwbwwbwbwbw`.

Is there a substring of S that consists of W occurrences of `w` and B occurrences of `b`?

▶ What is a substring of S?

Constraints

- W and B are integers.
- $0 \leq W, B \leq 100$
- $W + B \geq 1$

Input

The input is given from Standard Input in the following format:

W B

Output

If there is a substring of S that consists of W occurrences of `w` and B occurrences of `b`, print `Yes`; otherwise, print `No`.

Sample Input 1

```
3 2
```

Sample Output 1

```
Yes
```

The first 15 characters of S are `wbwbwwbwbwbwwbw`. You can take the 11-th through 15-th characters to form the string `bwwbw`, which is a substring consisting of three occurrences of `w` and two occurrences of `b`.

Sample Input 2

```
3 0
```

Sample Output 2

```
No
```

The only string consisting of three occurrences of `w` and zero occurrences of `b` is `www`, which is not a substring of S.

Sample Input 3

```
92 66
```

Sample Output 3

```
Yes
```

C - Σ

Time Limit: 2 sec / Memory Limit: 1024 MB

Score: 250 points

Problem Statement

You are given a sequence of positive integers $A = (A_1, A_2, \ldots, A_N)$ of length N and a positive integer K.

Find the sum of the integers between 1 and K, inclusive, that do not appear in the sequence A.

Constraints

- $1 \leq N \leq 2 \times 10^5$
- $1 \leq K \leq 2 \times 10^9$
- $1 \leq A_i \leq 2 \times 10^9$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$N \quad K$$
$$A_1 \quad A_2 \quad \dots \quad A_N$$

Output

Print the answer.

Sample Input 1

```
4 5
1 6 3 1
```

Sample Output 1

```
11
```

Among the integers between 1 and 5, three numbers, 2, 4, and 5, do not appear in A.

Thus, print their sum: $2+4+5=11$.

Sample Input 2

```
1 3
346
```

Sample Output 2

```
6
```

Sample Input 3

```
10 158260522
877914575 24979445 623690081 262703497 24979445 1822804784 1430302156 1161735902 923078537 1189330739
```

Sample Output 3

```
12523196466007058
```

D - Gomamayo Sequence

Time Limit: 2 sec / Memory Limit: 1024 MB

Score: 400 points

Problem Statement

You are given a string S of length N consisting of `0` and `1`.

A string T of length N consisting of `0` and `1` is a **good string** if and only if it satisfies the following condition:

- There is exactly one integer i such that $1 \leq i \leq N-1$ and the i-th and $(i+1)$-th characters of T are the same.

For each $i = 1, 2, \ldots, N$, you can choose whether or not to perform the following operation once:

- If the i-th character of S is `0`, replace it with `1`, and vice versa. The cost of this operation, if performed, is C_i.

Find the minimum total cost required to make S a good string.

Constraints

- $2 \leq N \leq 2 \times 10^5$
- S is a string of length N consisting of `0` and `1`.
- $1 \leq C_i \leq 10^9$
- N and C_i are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{aligned}
&N\\
&S\\
&C_1 \quad C_2 \quad \ldots \quad C_N
\end{aligned}
$$

Output

Print the answer.

Sample Input 1

```
5
00011
3 9 2 6 4
```

Sample Output 1

```
7
```

Performing the operation for $i = 1, 5$ and not performing it for $i = 2, 3, 4$ makes $S =$ `10010`, which is a good string. The cost incurred in this case is 7, and it is impossible to make S a good string for less than 7, so print 7.

Sample Input 2

```
4
1001
1 2 3 4
```

Sample Output 2

```
0
```

Sample Input 3

```
11
11111100111
512298012 821282085 543342199 868532399 690830957 973970164 928915367 954764623 923012648 540375785 9
25723427
```

Sample Output 3

```
2286846953
```

E - Paint

Time Limit: 2 sec / Memory Limit: 1024 MB

Score: 450 points

Problem Statement

There is a grid with H rows and W columns. Initially, all cells are painted with color 0.

You will perform the following operations in the order $i = 1, 2, \ldots, M$.

- If $T_i = 1$, repaint all cells in the A_i-th **row** with color X_i.
- If $T_i = 2$, repaint all cells in the A_i-th **column** with color X_i.

After all operations are completed, for each color i that exists on the grid, find the number of cells that are painted with color i.

Constraints

- $1 \leq H, W, M \leq 2 \times 10^5$
- $T_i \in \{1, 2\}$
- $1 \leq A_i \leq H$ for each i such that $T_i = 1$,
- $1 \leq A_i \leq W$ for each i such that $T_i = 2$.
- $0 \leq X_i \leq 2 \times 10^5$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{array}{lll}
H & W & M \\
T_1 & A_1 & X_1 \\
T_2 & A_2 & X_2 \\
\vdots & & \\
T_M & A_M & X_M
\end{array}
$$

Output

Let K be the number of distinct integers i such that there are cells painted with color i. Print $K+1$ lines.

The first line should contain the value of K.

The second and subsequent lines should contain, for each color i that exists on the grid, the color number i and the number of cells painted with that color.

Specifically, the $(i+1)$-th line $(1 \leq i \leq K)$ should contain the color number c_i and the number of cells x_i painted with color c_i, in this order, separated by a space.

Here, print the color numbers **in ascending order**. That is, ensure that $c_1 < c_2 < \ldots < c_K$. Note also that $x_i > 0$ is required.

Sample Input 1

```
3 4 4
1 2 5
2 4 0
1 3 3
1 3 2
```

Sample Output 1

```
3
0 5
2 4
5 3
```

The operations will change the colors of the cells in the grid as follows:

```
0000   0000   0000   0000   0000
0000 → 5555 → 5550 → 5550 → 5550
0000   0000   0000   3333   2222
```

Eventually, there are five cells painted with color 0, four with color 2, and three with color 5.

Sample Input 2

```
1 1 5
1 1 1
1 1 10
2 1 100
1 1 1000
2 1 10000
```

Sample Output 2

```
1
10000 1
```

Sample Input 3

```
5 5 10
1 1 1
1 2 2
1 3 3
1 4 4
1 5 5
2 1 6
2 2 7
2 3 8
2 4 9
2 5 10
```

Sample Output 3

```
5
6 5
7 5
8 5
9 5
10 5
```

F - SSttrriinngg in StringString

Time Limit: 3 sec / Memory Limit: 1024 MB

Score: 525 points

Problem Statement

For a string X of length n, let $f(X, k)$ denote the string obtained by repeating k times the string X, and $g(X, k)$ denote the string obtained by repeating k times the first character, the second character, . . ., the n-th character of X, in this order. For example, if $X =$ abc, then $f(X, 2) =$ abcabc, and $g(X, 3) =$ aaabbbccc. Also, for any string X, both $f(X, 0)$ and $g(X, 0)$ are empty strings.

You are given a positive integer N and strings S and T. Find the largest non-negative integer k such that $g(T, k)$ is a (not necessarily contiguous) subsequence of $f(S, N)$. Note that $g(T, 0)$ is always a subsequence of $f(S, N)$ by definition.

▶ What is a subsequence?

Constraints

- N is an integer.
- $1 \leq N \leq 10^{12}$
- S and T are strings consisting of lowercase English letters with lengths between 1 and 10^5, inclusive.

Input

The input is given from Standard Input in the following format:

N
S
T

Output

Print the largest non-negative integer k such that $g(T, k)$ is a (not necessarily contiguous) subsequence of $f(S, N)$.

Sample Input 1

```
3
abc
ab
```

Sample Output 1

```
2
```

We have $f(S, 3) =$ abcabcabc. $g(T, 2) =$ aabb is a subsequence of $f(S, 3)$, but $g(T, 3) =$ aaabbb is not, so print 2.

Sample Input 2

```
3
abc
arc
```

Sample Output 2

```
0
```

Sample Input 3

```
1000000000000
kzazkakxkk
azakxk
```

Sample Output 3

```
344827586207
```

G - Alone

Time Limit: 3 sec / Memory Limit: 1024 MB

Score: 575 points

Problem Statement

You are given an integer sequence $A = (A_1, A_2, \ldots, A_N)$.

Find the number of pairs of integers (L, R) that satisfy the following conditions:

- $1 \leq L \leq R \leq N$
- There is a number that appears exactly once among $A_L, A_{L+1}, \ldots, A_R$. More precisely, there is an integer x such that exactly one integer i satisfies $A_i = x$ and $L \leq i \leq R$.

Constraints

- $2 \leq N \leq 2 \times 10^5$
- $1 \leq A_i \leq N$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

N
$A_1 \quad A_2 \quad \dots \quad A_N$

Output

Print the answer.

Sample Input 1

```
5
2 2 1 2 1
```

Sample Output 1

```
12
```

12 pairs of integers satisfy the conditions: $(L, R) =$
$(1, 1), (1, 3), (1, 4), (2, 2), (2, 3), (2, 4), (3, 3), (3, 4), (3, 5), (4, 4), (4, 5), (5, 5)$.

Sample Input 2

```
4
4 4 4 4
```

Sample Output 2

```
4
```

Sample Input 3

```
10
1 2 1 4 3 3 3 2 2 4
```

Sample Output 3

```
47
```