A - Wrong Answer

Time Limit: 2 sec / Memory Limit: 1024 MB

Score: 100 points

Problem Statement

You are given two integers A and B, each between 0 and 9, inclusive.

Print any integer between 0 and 9, inclusive, that is not equal to $A + B$.

Constraints

- $0 \leq A \leq 9$
- $0 \leq B \leq 9$
- $A + B \leq 9$
- A and B are integers.

Input

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

```
A B
```

Output

Print any integer between 0 and 9, inclusive, that is not equal to $A + B$.

Sample Input 1

```
2 5
```

Sample Output 1

```
2
```

When $A = 2, B = 5$, we have $A + B = 7$. Thus, printing any of $0, 1, 2, 3, 4, 5, 6, 8, 9$ is correct.

Sample Input 2

```
0 0
```

Sample Output 2

```
9
```

Sample Input 3

```
7 1
```

Sample Output 3

```
4
```

B - Adjacency Matrix

Time Limit: 2 sec / Memory Limit: 1024 MB

Score: 150 points

Problem Statement

There is a simple undirected graph G with N vertices labeled with numbers $1, 2, \ldots, N$.

You are given the adjacency matrix $(A_{i,j})$ of G. That is, G has an edge connecting vertices i and j if and only if $A_{i,j} = 1$.

For each $i = 1, 2, \ldots, N$, print the numbers of the vertices directly connected to vertex i in **ascending order**.

Here, vertices i and j are said to be directly connected if and only if there is an edge connecting vertices i and j.

Constraints

- $2 \leq N \leq 100$
- $A_{i,j} \in \{0, 1\}$
- $A_{i,i} = 0$
- $A_{i,j} = A_{j,i}$
- All input values are integers.

Input

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

$$
\begin{aligned}
&N \\
&A_{1,1} \quad A_{1,2} \quad \dots \quad A_{1,N} \\
&A_{2,1} \quad A_{2,2} \quad \dots \quad A_{2,N} \\
&\vdots \\
&A_{N,1} \quad A_{N,2} \quad \dots \quad A_{N,N}
\end{aligned}
$$

Output

Print N lines. The i-th line should contain the numbers of the vertices directly connected to vertex i in ascending order, separated by a space.

Sample Input 1

```
4
0 1 1 0
1 0 0 1
1 0 0 0
0 1 0 0
```

Sample Output 1

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

Vertex 1 is directly connected to vertices 2 and 3. Thus, the first line should contain 2 and 3 in this order.

Similarly, the second line should contain 1 and 4 in this order, the third line should contain 1, and the fourth line should contain 2.

Sample Input 2

```
2
0 0
0 0
```

Sample Output 2

```

```

G may have no edges.

Sample Input 3

```
5
0 1 0 1 1
1 0 0 1 0
0 0 0 0 1
1 1 0 0 1
1 0 1 1 0
```

Sample Output 3

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

C - 343

Time Limit: 2 sec / Memory Limit: 1024 MB

Score: 250 points

Problem Statement

You are given a positive integer N.

Find the maximum value of a palindromic cube number not greater than N.

Here, a positive integer K is defined to be a palindromic cube number if and only if it satisfies the following two conditions:

- There is a positive integer x such that $x^3 = K$.
- The decimal representation of K without leading zeros is a palindrome. More precisely, if K is represented as $K = \sum_{i=0}^{L-1} A_i 10^i$ using integers $A_0, A_1, \ldots, A_{L-2}$ between 0 and 9, inclusive, and an integer A_{L-1} between 1 and 9, inclusive, then $A_i = A_{L-1-i}$ for all $i = 0, 1, \ldots, L-1$.

Constraints

- N is a positive integer not greater than 10^{18}.

Input

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

```
N
```

Output

Print the answer.

Sample Input 1

```
345
```

Sample Output 1

```
343
```

343 is a palindromic cube number, while 344 and 345 are not. Thus, the answer is 343.

Sample Input 2

```
6
```

Sample Output 2

```
1
```

Sample Input 3

```
123456789012345
```

Sample Output 3

```
1334996994331
```

D - Diversity of Scores

Time Limit: 2 sec / Memory Limit: 1024 MB

Score: 400 points

Problem Statement

Takahashi is hosting a contest with N players numbered 1 to N. The players will compete for points. Currently, all players have zero points.

Takahashi's foreseeing ability lets him know how the players' scores will change. Specifically, for $i = 1, 2, \ldots, T$, the score of player A_i will increase by B_i points at i seconds from now. There will be no other change in the scores.

Takahashi, who prefers diversity in scores, wants to know how many different score values will appear among the players' scores at each moment. For each $i = 1, 2, \ldots, T$, find the number of different score values among the players' scores at $i + 0.5$ seconds from now.

For example, if the players have 10, 20, 30, and 20 points at some moment, there are three different score values among the players' scores at that moment.

Constraints

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

Input

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

$$
\begin{array}{ll}
N & T \\
A_1 & B_1 \\
A_2 & B_2 \\
\vdots & \\
A_T & B_T
\end{array}
$$

Output

Print T lines. The i-th line $(1 \leq i \leq T)$ should contain an integer representing the number of different score values among the players' scores at $i + 0.5$ seconds from now.

Sample Input 1

```
3 4
1 10
3 20
2 10
2 10
```

Sample Output 1

```
2
3
2
2
```

Let S be the sequence of scores of players $1, 2, 3$ in this order. Currently, $S = \{0, 0, 0\}$.

- After one second, the score of player 1 increases by 10 points, making $S = \{10, 0, 0\}$. Thus, there are two different score values among the players' scores at 1.5 seconds from now.
- After two seconds, the score of player 3 increases by 20 points, making $S = \{10, 0, 20\}$. Thus, there are three different score values among the players' scores at 2.5 seconds from now.
- After three seconds, the score of player 2 increases by 10 points, making $S = \{10, 10, 20\}$. Therefore, there are two different score values among the players' scores at 3.5 seconds from now.
- After four seconds, the score of player 2 increases by 10 points, making $S = \{10, 20, 20\}$. Therefore, there are two different score values among the players' scores at 4.5 seconds from now.

Sample Input 2

```
1 3
1 3
1 4
1 3
```

Sample Output 2

```
1
1
1
```

Sample Input 3

```
10 10
7 2620
9 2620
8 3375
1 3375
6 1395
5 1395
6 2923
10 3375
9 5929
5 1225
```

Sample Output 3

```
2
2
3
3
4
4
5
5
6
5
```

E - 7x7x7

Time Limit: 2 sec / Memory Limit: 1024 MB

Score: 475 points

Problem Statement

In a coordinate space, we want to place three cubes with a side length of 7 so that the volumes of the regions contained in exactly one, two, three cube(s) are V_1, V_2, V_3, respectively.

For three integers a, b, c, let $C(a, b, c)$ denote the cubic region represented by $(a \leq x \leq a+7) \land (b \leq y \leq b+7) \land (c \leq z \leq c+7)$.

Determine whether there are nine integers $a_1, b_1, c_1, a_2, b_2, c_2, a_3, b_3, c_3$ that satisfy all of the following conditions, and find one such tuple if it exists.

- $|a_1|, |b_1|, |c_1|, |a_2|, |b_2|, |c_2|, |a_3|, |b_3|, |c_3| \leq 100$
- Let $C_i = C(a_i, b_i, c_i)$ $(i = 1, 2, 3)$.
  - The volume of the region contained in exactly one of C_1, C_2, C_3 is V_1.
  - The volume of the region contained in exactly two of C_1, C_2, C_3 is V_2.
  - The volume of the region contained in all of C_1, C_2, C_3 is V_3.

Constraints

- $0 \leq V_1, V_2, V_3 \leq 3 \times 7^3$
- All input values are integers.

Input

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

V_1 V_2 V_3

Output

If no nine integers $a_1, b_1, c_1, a_2, b_2, c_2, a_3, b_3, c_3$ satisfy all of the conditions in the problem statement, print `No`. Otherwise, print such integers in the following format. If multiple solutions exist, you may print any of them.

```
Yes
a_1 b_1 c_1 a_2 b_2 c_2 a_3 b_3 c_3
```

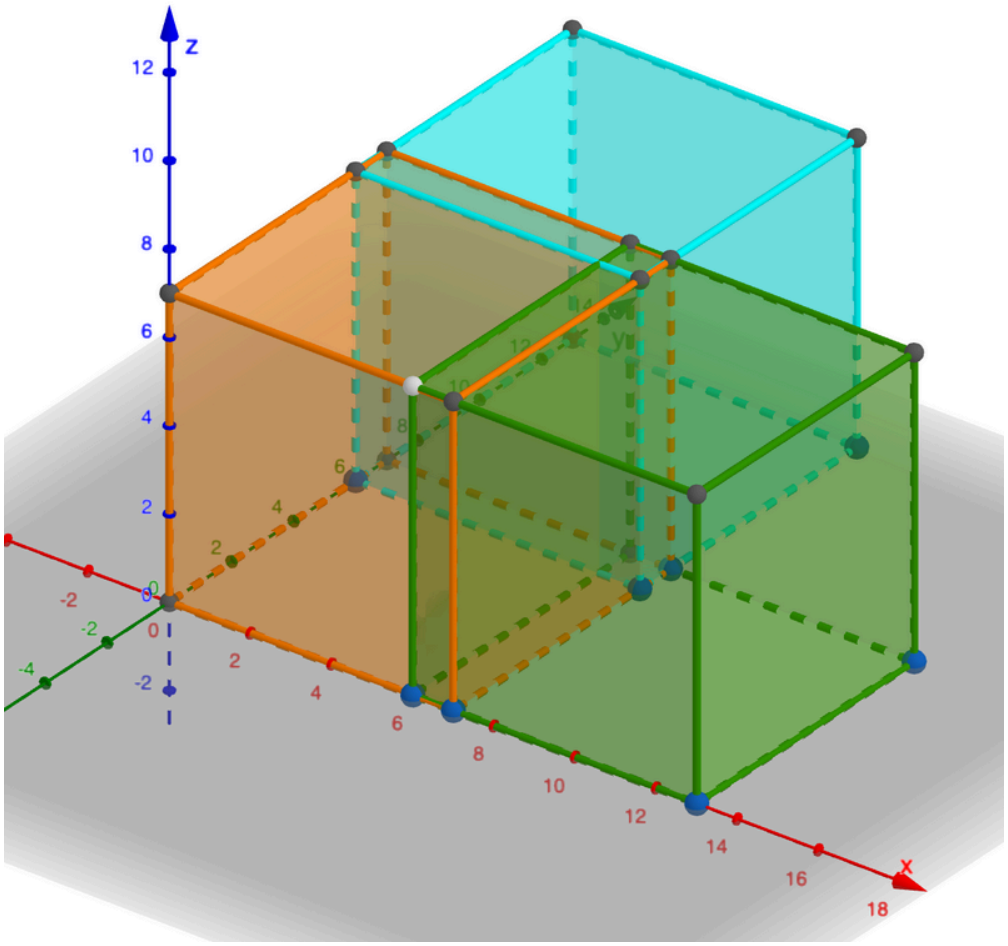
Sample Input 1

```
840 84 7
```

Sample Output 1

```
Yes
0 0 0 0 6 0 6 0 0
```

Consider the case $(a_1, b_1, c_1, a_2, b_2, c_2, a_3, b_3, c_3) = (0, 0, 0, 0, 6, 0, 6, 0, 0)$.



The figure represents the positional relationship of C_1, C_2, and C_3, corresponding to the orange, cyan, and green cubes, respectively.

Here,

- All of $|a_1|, |b_1|, |c_1|, |a_2|, |b_2|, |c_2|, |a_3|, |b_3|, |c_3|$ are not greater than 100.
- The region contained in all of C_1, C_2, C_3 is $(6 \leq x \leq 7) \wedge (6 \leq y \leq 7) \wedge (0 \leq z \leq 7)$, with a volume of $(7-6) \times (7-6) \times (7-0) = 7$.
- The region contained in exactly two of C_1, C_2, C_3 is $((0 \leq x < 6) \wedge (6 \leq y \leq 7) \wedge (0 \leq z \leq 7)) \vee ((6 \leq x \leq 7) \wedge (0 \leq y < 6) \wedge (0 \leq z \leq 7))$, with a volume of $(6-0) \times (7-6) \times (7-0) \times 2 = 84$.
- The region contained in exactly one of C_1, C_2, C_3 has a volume of 840.

Thus, all conditions are satisfied.

$(a_1, b_1, c_1, a_2, b_2, c_2, a_3, b_3, c_3) = (-10, 0, 0, -10, 0, 6, -10, 6, 1)$ also satisfies all conditions and would be a valid output.

Sample Input 2

```
343 34 3
```

Sample Output 2

```
No
```

No nine integers $a_1, b_1, c_1, a_2, b_2, c_2, a_3, b_3, c_3$ satisfy all of the conditions.

F - Second Largest Query

Time Limit: 2 sec / Memory Limit: 1024 MB

Score: 525 points

Problem Statement

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

Process Q queries in the order they are given. Each query is of one of the following two types:

- Type 1: Given in the form `1 p x`. Change the value of A_p to x.
- Type 2: Given in the form `2 l r`. print the **number of occurrences** of the second largest value in $(A_l, A_{l+1}, \ldots, A_r)$. More precisely, print the number of integers i satisfying $l \leq i \leq r$ such that there is exactly one distinct value greater than A_i among $A_l, A_{l+1}, \ldots, A_r$.

Constraints

- $1 \leq N, Q \leq 2 \times 10^5$
- $1 \leq A_i \leq 10^9$
- For type-1 queries, $1 \leq p \leq N$.
- For type-1 queries, $1 \leq x \leq 10^9$.
- For type-2 queries, $1 \leq l \leq r \leq N$.
- There is at least one type-2 query.
- All input values are integers.

Input

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

$$
\begin{aligned}
&N \quad Q \\
&A_1 \quad A_2 \quad \dots \quad A_N \\
&\mathrm{query}_1 \\
&\vdots \\
&\mathrm{query}_Q
\end{aligned}
$$

Here, query_i is the i-th query and given in one of the following formats:

$$1 \quad p \quad x$$

$$2 \quad l \quad r$$

Output

Let q be the number of type-2 queries. Print q lines. The i-th line should contain the response to the i-th type-2 query.

Sample Input 1

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

Sample Output 1

```
1
0
2
```

Initially, $A = (3, 3, 1, 4, 5)$.

For the first query, the second largest value in $(3, 3, 1)$ is 1, which appears once in $3, 3, 1$, so print 1.

For the second query, there is no second largest value in (5), so print 0.

The third query makes $A = (3, 3, 3, 4, 5)$.

For the fourth query, the second largest value in $(3, 3, 4)$, is 3, which appears twice in $3, 3, 4$, so print 2.

Sample Input 2

```
1 1
1000000000
2 1 1
```

Sample Output 2

```
0
```

Sample Input 3

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

Sample Output 3

```
0
1
0
2
4
```

G - Compress Strings

Time Limit: 5 sec / Memory Limit: 1024 MB

Score: 600 points

Problem Statement

You are given N strings $S_1, S_2, \ldots, S_N$.

Find the minimum length of a string that contains all these strings as substrings.

Here, a string S contains a string T as a substring if T can be obtained by deleting zero or more characters from the beginning and zero or more characters from the end of S.

Constraints

- N is an integer.
- $1 \leq N \leq 20$
- S_i is a string consisting of lowercase English letters whose length is at least 1.
- The total length of $S_1, S_2, \ldots, S_N$ is at most 2×10^5.

Input

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

$$
\begin{aligned}
&N \\
&S_1 \\
&S_2 \\
&\vdots \\
&S_N
\end{aligned}
$$

Output

Print the answer as an integer.

Sample Input 1

```
3
snuke
kensho
uk
```

Sample Output 1

```
9
```

The string snukensho of length 9 contains all of S_1, S_2, and S_3 as substrings.

Specifically, the first to fifth characters of snukensho correspond to S_1, the fourth to ninth correspond to S_2, and the third to fourth correspond to S_3.

No shorter string contains all of S_1, S_2, and S_3 as substrings. Thus, the answer is 9.

Sample Input 2

```
3
abc
abc
arc
```

Sample Output 2

```
6
```

Sample Input 3

```
6
cmcmrcc
rmrrrmr
mrccm
mmcr
rmmrmrcc
ccmcrcmcm
```

Sample Output 3

```
27
```