1. You are given an array of stock prices of a company for the next N days. A value at index i represents the stock price at day number i (starting from 0). On any given day, you can:
   - Buy one stock
   - Sell any number of stocks you currently own
   - Do nothing

You want to maximize your profit by deciding which action to perform when. Display the maximum possible profit that you can get.

Input :
N, the size of the array
An array A, which contains the stock prices of the company for N days.

Output:
The maximum profit.

Sample input:
6
73 44 67 98 76 94

Sample Output:
128

2. You are playing a game with a robot. The game starts with two integers: A and M. The robot makes exactly one move in the entire game, and it does so at the very beginning - it will remove exactly 1 digit from A and output it as the starting value (say X). Note that the value A remains intact. It is not changed by the robot. After the robot makes its moves, it is your turn. You can make an unlimited number of moves. In each move, you must remove exactly 1 digit from A and append it to X (to the right side of X). Again note that none of your moves change the value of A. You win if you can eventually make X a multiple of M (i.e. X mod M = 0). How many possible starting moves bot can make such that you are guaranteed to win assuming you play optimally?

Sample Input:

1003 4

Sample output:

4

3. Chet has two sequences A and B, each with length N. He can apply the following magic operation an arbitrary number of times (including zero): choose an index i ($1 \le i \le N-2$) and add 1 to A[i], 2 to A[i+1] and 3 to A[i+2], i.e. change A[i] to A[i]+1, A[i+1] to A[i+1]+2 and

A[i+2] to A[i+2]+3. Chet wants to transform A into B by applying the magic operation, but is not sure if it will be possible in all cases. Given two sequences A and B, you have to inform Chet if he can transform A into B.

Sample Input:
1
6
1 1 1 1 1 1
1 2 3 4 1 1
Sample Output:
Yes

4. Given a string of digits, find the longest increasing 'sub' sequence within it. Now, remove this sub-sequence from the string and perfom the same process on the resultant string. Repeat this process until you obtain a string of length three(or less) and print the string.

If there are two or more longest increasing subsequences in the string, they are removed simultaneously, ie, in the same step.
Sample input:
6
3 10 2 1 20 25
2 1

5. Sumit is doing research in mathematics . After doing lots of research, he is stuck in a problem . He found four numbers n,a, b and c .Now, he wants to know how many numbers exist which are less than or equal to n and are divisible by a ,b or c. Given a,b,c and n, print all such numbers lesser than n.

6. Samyuktha is given a string and is asked to determine if the string is valid or not. A string is valid if the frequency of each letter in the string is the same or if after deleting any one character from the string, the frequency of each letter becomes equal. Help Samyuktha determine if the string is valid or not!

   For example, 'xyz' is a valid string because the frequency of each letter is one. The string 'xyyz' is also valid because after removing one 'y' the frequency of each character becomes the same, that is 1. However, 'xyzzz' is not valid because even after removing one 'z' the frequencies of the characters are different, hence 'xyzzz' is an invalid string.

Input Format:
A single string s.
Output Format:
Print YES if valid, else print NO.
Constraints:
1<=|s|<=10^5

Each character s[i] is in lowercase ascii representation.

Sample Input:
abbcc
Sample Output:
YES

7. Caesar's Cipher is a very famous encryption technique used in cryptography. It is a type of substitution cipher in which each letter in the plaintext is replaced by a letter some fixed number of positions down the alphabet. For example, with a shift of *3*, *D* would be replaced by *G*, *E* would become *H*, *X* would become *A* and so on.
   Encryption of a letter *X* by a shift *K* can be described mathematically as EK(X)=(X+K) % 26.

Given a plaintext and it's corresponding ciphertext, output the minimum non- negative value of shift that was used to encrypt the plaintext or else output -1 if it is not possible to obtain the given ciphertext from the given plaintext using Caesar's Cipher technique.

Sample input
2
ABC
DEF
AAA
PQR

Sample output

3
-1

8. Given a string, print all possible permutations of a given string in lexicographic order.

Note – importing permutations from itertools is not allowed.

9. Bob is making a video conference software. Whenever a new person joins the conference, Bob displays the person's name in the interface.

However, displaying full name is tedious and takes much space. So he decided to display the shortest prefix which doesn't match with any prefix of any person who has joined earlier.

Let's suppose the first person to enter the conference is alvin.

Now suppose next person to join is alice. The shortest prefix of alice that doesn't match with any prefix of alvin is ali. If the full name of a new person matches completely with the full name of any person who has joined earlier, he will display the full name and add a suffix which indicates how many times the same name has occurred in the list so far. For example, if another person name alvin joins, the list will look like this:You are given the list of the persons who have joined the call in the chronological order. Your task is to figure out how the final list looks like.

Input Format:

The first line contains an integer n
The subsequent n lines contain a string denoting the name of the person to join the call.

Constraints: 1<= n <= 10^5, length of every name is less than or equal to 10, every string only contains lower case alphabets.

Sample Test case:

input:

3

alvin

alice

alvin

output:

a

ali

alvin2

10. Given an integer N and the number of integers which are lesser than N and coprime to it, find the prime factorization of N.

Sample Input:

6 2

Sample Output:

2 1

3 1

Here, 6 = 2*3, therefore output is read as (2^1)*(3^1)

11. Chris, Wendy, Irene, and Felix are four friends sharing a one-room workspace. The workspace has a single thermostat which they can set to any integer temperature between 35 degrees to 95 degrees Fahrenheit, inclusive.

The four friends can't agree on the room's temperature! Chris and Wendy don't want it to be too cold, while Irene and Felix don't want it to be too hot. Specifically:

- Chris wants it to be *at least* c1 degrees Fahrenheit.
- Wendy wants it to be *at least c2* degrees Fahrenheit.
- Irene wants it to be *at most* h1 degrees Fahrenheit.
- Felix wants it to be *at most* h2 degrees Fahrenheit.

Given c1,c2 ,h1 and h2, is there a satisfactory temperature that all four friends will be happy with? If it's possible, print YES; otherwise, print NO.

Sample Input:
50 40 70 60
Sample Output:
YES

12. Given a square matrix, write a program to find the determinant of the matrix. The size of the matrix n (n<=6) will be taken as input along with the matrix.

Sample input :
[[3 4 5 6 1 2],
[1 2 3 4 6 7],
[4 5 1 9 8 4],
[1 3 5 7 8 6],
[6 6 2 4 7 9],
[9 8 7 6 5 4]]

Output:
-5184

13. We're going to make our own *Contacts* application! The application must perform two types of operations:

- `add name`, where name is a string denoting a contact name. This must store name as a new contact in the application.
- `find partial`, where partial is a string denoting a partial name to search the application for. It must count the number of contacts starting with partial and print the count on a new line.

Given n sequential *add* and *find* operations, perform each operation in order.

Input Format

The first line contains a single integer,n , denoting the number of operations to perform.

Each line i of the n subsequent lines contains an operation in one of the two forms defined above.

Constraints

- $1<=n<10^5$
- 1<=| name |<=21
- 1<=| partial |<=21
- It is guaranteed that name and partial contain lowercase English letters only.
- The input doesn't have any duplicate name for the add operation.

Output Format

For each find partial operation, print the number of contact names starting with on a new line.

Sample Input

```
4
add bucky
add bucket
find buc
find bak
```

Sample Output

```
2
0
```

Explanation

We perform the following sequence of operations:

- Add a contact named bucky.
- Add a contact named bucket.
- Find and print the number of contact names beginning with buc. There are currently two contact names in the application and both of them start with buc, so we print 2 on a new line.
- Find and print the number of contact names beginning with bak. There are currently two contact names in the application but neither of them start with bak, so we print 0 on a new line

14. Barry is the coach of a basketball club. There are n players in the team, and player i has a height h_i of cm.

- Function f(i,j) is the measure of the teamwork between player i and j. Then $f(i,j)=h_i+h_j$.
- Function P(S) is the power of set S, consisting some players. Then $P(S)=\sum f(i,j)$, for all i and j, where I and j are players in set S.

For example, there are 2 players in set, with h_i={2,3}, and indexes 1,2 respectively. Then power of this set is equal to f(1,1)+f(1,2)+f(2,1)+f(2,2)=4+5+5+6.

The team is going to take part in a tournament. There are rounds in the tournament, each of them having some conditions.

For round i, the requirements are:

There are three positive integers l_i, r_i,x_i. To participate in round i, Barry needs to find minimal K such that there's at least one consecutive sub-sequence of players between l and r, where height of each player in this sub-sequence is at most K , and power of this sub-sequence is not less than x_i. If there exists such K, Barry's team is able to participate in round i. Otherwise, the team is not eligible.

You need to help him determine for every round, is it possible to participate in that round. If it is possible, print minimal K for round i, otherwise print -1.

Input Format

The first line contains two integers n and m - the number of players and rounds respectively.

The second line contains array of n positive integers h_i.

The next m lines contains three positive integers: l_i, r_i,x_i.

Constraints

- $1<=n,m<=3X10^6$
- $1<=h_i<=10^7$
- $1<=l_i<=r_i<=n$
- $1<=x_i<=10^{18}$

Output Format

For every round print minimal K if it's possible, otherwise print -1.

Sample Input 0

```
5 2
1 1 2 3 4
1 5 2
1 5 11
```

Sample Output 0

```
1
2
```

15. Given an integer M, an 8 * 8 chessboard and the king is placed on one of the square of the chessboard. Let the coordinate of the king be (R, C).

The task is to count the number of position where the king can reach (excluding the initial position) from the given square in exactly M moves.

Sample input:
1 (m)
2 (r)
3 (c)
Output:
5