Problem A. Greater Sum Tree

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Given the root of a **binary search** tree with distinct values, modify it so that every *node* has a new value equal to the sum of the values of the original tree that are greater than *node.val* and each *node.val* are unique. Print new values in order to the original tree from larger to less.

As a reminder, a binary search tree is a tree that satisfies these constraints:

- The left subtree of a node contains only nodes with keys less than the node's key.
- The right subtree of a node contains only nodes with keys greater than the node's key.
- Both the left and right subtrees must also be binary search trees.

Input

The number of nodes n in the tree is between 1 and 100. Each node will have value between 0 and 1000. The given tree is a binary search tree.

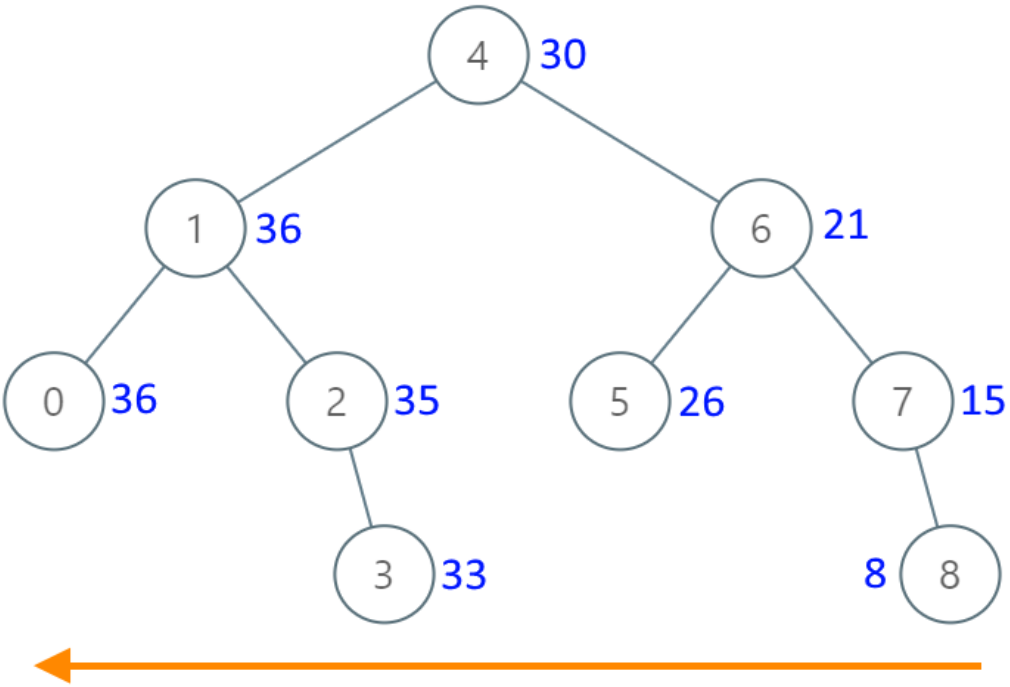
Output

In a single line print the answer.

Example

standard input	standard output
9 4 1 6 0 2 3 5 7 8	8 15 21 26 30 33 35 36 36

Note



NOTE: Solve with **BST**!

Problem B. Width

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Given a binary tree, write a program to get the maximum width of the given tree. The width of a tree is the maximum width among all levels. The binary tree has the same structure as a full binary tree, but some nodes are null.

The width of one level is defined as the length between the end-nodes (the leftmost and right most non-null nodes in the level, where the null nodes between the end-nodes are also counted into the length calculation.

Vertex number 1 always will be root.

Input

Given integer n— ($1 \leq |n| \leq 10^3$), number of vertexes. The next n lines has x, y, z, description of binary tree, means that vertex y son of vertex x, if z = 0, it is left son, if z = 1 it is right son.

Output

Print one integer maximum width.

Examples

standard input	standard output
6 1 2 1 1 3 0 3 5 0 3 6 1 2 4 1	4
4 1 2 0 2 3 0 2 4 1	2

Note

sample 1:

Explanation: The maximum width existing in the third level with the length 4 (5,6,null,4).

sample 2:
Explanation: The maximum width existing in the third level with the length 2 (3,4).

Problem C. Trucks

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

For sure, the love mobiles will roll again on this summer's street parade. Each year, the organisers decide on a fixed order for the decorated trucks. Experience taught them to keep free a side street to be able to bring the trucks into order.

The side street is so narrow that no two cars can pass each other. Thus, the love mobile that enters the side street last must necessarily leave the side street first. Because the trucks and the ravers move up closely, a truck cannot drive back and re-enter the side street or the approach street.

You are given the order in which the love mobiles arrive. Write a program that decides if the love mobiles can be brought into the order that the organisers want them to be.

Input

The first line contains a single number n, the number of love mobiles. The second line contains the numbers 1 to n in an arbitrary order. All the numbers are separated by single spaces. These numbers indicate the order in which the trucks arrive in the approach street. No more than 1000 love mobiles participate in the street parade.

Output

Your program has to output a line containing a single word "yes"if the love mobiles can be re-ordered with the help of the side street, and a single word "no"in the opposite case.

Examples

standard input	standard output
5 5 1 2 4 3	yes
5 2 1 4 5 3	no

Problem D. Who has a big Family?

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

In any connected component of the graph,vertex with the lowest value in that component serves as the parent. A vertex is "BigFam"if it has more children than its parent. Please,count the number of "BigFam"vertices in the given graph.The graph has no cycles or self loops.

Input

On the first line there are two separated integers N and M and the following M lines consist of twoseparated integers X and Y means that there is an edge between vertices X and Y.

Output

Print the number of "BigFams"

Example

standard input	standard output
4 3 1 2 2 3 2 4	1

Problem E. Path

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

In an undirected graph, you need to find the shortest path between two vertices.

Input

In the first line given one number n, number of vertices. 1<=n<=100. Then in n lines given, and n elements in each line '0' or '1'. 0 indicates the absence of an edge, 1 indicates the presence of an edge. Then, the numbers of two vertices are recorded the initial and final.

Output

Print the length of the shortest path. If the path does not exist, print a single number.

Examples

standard input	standard output
5 0 1 0 0 1 1 0 1 0 0 0 1 0 0 0 0 0 0 0 0 1 0 0 0 0 3 5	3
5 0 1 1 1 1 1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 1 0 0 0 0 3 5	2

Problem F. Win me if you can!

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Mark is goint to fight for Fight Club. There were N competitors with different powers. There will be P rounds to fight and in each round Mark's power will be changed. With power M, Mark can kill all the competitors whose power is equal or less than his. Round by round, all the competitors who are dead in previous round will reborn. Such that in each round there will be N competitors to fight. As Mark is tired, please,help him to count the number of competitors that he can win in each round and total sum of their powers.

Input

First line contains number of competitors without Mark. Next line contant powers of these competitors. Line 3 contains number of rounds. The last lines show power of Mark on each round.

$1 \leq \mathrm{N} \leq 10^6$ $1 \leq a[i] \leq 10^3$

Output

Show on each line how many competitors he will win and the sum of their powers.

Example

standard input	standard output
7 7 9 1 8 2 6 2 2 4 8	3 5 6 26

Problem G. Hana Kagerou

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

When preparing problems for next algorithm quiz, Nyaruko created a problem she couldn't solve herself. Since it was very late she decided to use this problem in a quiz and requested a help from you.

You are given graph with n nodes, and m segments with some cost. For each segment $[l, r]$ with cost c, add edges x, y with cost c for all pairs of vertices such that $l \leq x < y \leq r$. Find the cost of MST(Minimum spanning tree) in the resulting graph. It's guranteed that the graph will be connected.

Input

First line contains two integers $n, m (2 \leq n, m \leq 2 * 10^5)$. Next m lines contain three integers $l, r, c (1 \leq l < r \leq n, 1 \leq c \leq 10^9)$ - endpoints of the segment and its cost.

Output

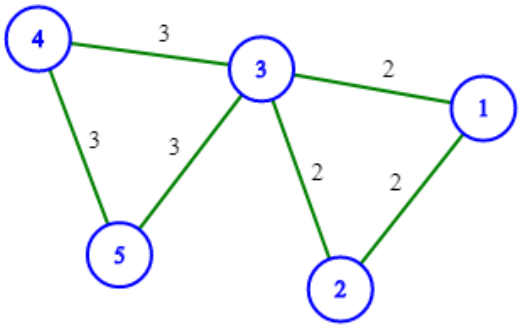
Output single integer - minimum cost of the MST.

Examples

standard input	standard output
5 2 1 3 2 3 5 3	10
10 3 1 5 3 3 10 100 8 10 4	320

Note

Graph in the first example looks like this.



Problem H. Plagiarism

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Alimzhan wanted to check his students for cheating and he added the parasite word to his exam

He believes that students cheat if the parasite word occurs in the same place in two different results of two students

Alimzhan heard that two of his most beloved students were copied from each other.

Help Alimzhan know how many times the parasite word is repeated in the same position in his beloved students' results

Note that results have the same length.

Input

The first line contains one string s1 (size<=100000) - result of first student.

The second line contains one string s2 (size<=100000) - result of second student.

The third line contains one string t (size<=100000) - parasite word.

Output

Output number of positions where parasite word meets in both students' results.

Examples

standard input	standard output
kbtuutbkkbtu utbkkbtukbtu kbtu	1
aaaaa aaaaa a	5
abracadabra abacabaabac ab	2

Note

Set 999999 elements for arrays

Problem I. Polyglot

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Beksultan is polyglot and he studying new language. He know that, some unknown words could be recognized by some words's patterns (ex: polyglot could be described as poly-many glotta - language). So, to understand this word, he want to study little patterns. In dictionary he found a lot of patterns that appeared at least once in main word, but he do not want to learn them all, only most frequently appeared.
Beksultan is very lazy, so he asks you to help him find such patterns.

Input

The first line is an integer - N, the number of patterns, $1 \leqslant N \leqslant 150$. Each of the following N lines contains one pattern, whose length is in range [1,101].
Last line contains one large string, whose length is up to 10^5.

Output

First, print number of appearence most frequently appeared pattern, than print this pattern. If there is more than one, print all of them in input order.

Examples

standard input	standard output
2 aba bab abababababac	4 aba
6 beta alpha haha delta dede tata dedeltalphahahahototatalpha	2 alpha haha

Note

Note that in main string and in all patterns used only lower english letters.
In first sample 'aba' pattern appeared 4 times in main string.
In second sample 'haha' and 'alpha' patterns appeared in main string twice.

Problem J. Queries on trie

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Josuke Higashikata wants to come up with his own data structure. According to his idea, his structure should be able to:
1) add a string to the DS.
2) calculate the count of strings in the DS, with the given prefix.
Help him solve this problem.

Input

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.

Output

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

Example

standard input	standard output
4 add hack add hackerearth find hac find hak	2 0