Problem A. Dead code analysis

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

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Jamal is an intern at SGATS working on a software that detects dead code within millions of code lines. He's looking for an optimal solution that will not consume much time to finish the execution.

His best idea so far is an incremental approach: given an initial state of the source code, and a series of the changes. He will compute after each change how many classes are unreachable from the root class, and thus considered as dead.

Source code is represented as a set of classes and the relationships between them. For the sake of this problem, consider relationships as mutual.

Jamal will focus for now only on changes that add relationships between existing classes.

Input

The first line of the input consists of three integers: N M Q

- N: the number of classes
- M: the number of initial relationships
- Q: the number of changes
- $1 \leq N, M, Q \leq 10^5$

A class is represented as integer c where $1 \leq c \leq N$. Class **1** is the root class.

Following M lines describe the initial relationships. Each line contains two integers representing the two classes in relationship.

Following Q lines describe the successive changes on the initial source code. Each line contains two integers representing the two classes in the new relationship

Output

For each change, the number of unreachable classes from the root.

Example

standard input	standard output

6 2 4
1 2
3 4
1 2
2 4
5 6
4 5
	4
	2
	2
	0

Problem B. Lazy Miller

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	64 megabytes
Balloon Color:	`Blue`

Miler is a lazy student at INPT. He is so lazy that his new year's resolution is to be absent for at least M hours this current semester.

Miler has N subjects to attend this semester (so N exams to pass), each subject has a difficulty of D_i, an hourly volume of H_i, and an allowed number of hours to be absent of A_i, once Miler is absent for more than A_i at subject i, he won't be able to pass the normal session exam of subject i, and he'll have to retake the exam later (resis session).
Miler wants to absent at least M hours this semester and avoid retaking any exam. If that is impossible, Miler wants the sum of difficulties of exams he will retake to be as minimum as possible.

Input

The first line of input will contain a number T the number of test cases: $1 \leq T \leq 50$
Each test cases will contain 4 lines:

- The First line contains N and M: $(2 \leq N \leq 50, M \leq Sum(H_i))$.
- The Second line contains N numbers, representing D_i, the difficulty of the exam for each subject: $(1 \leq D_i \leq 100)$.
- The Third line contains N numbers H_i, representing the hourly volume of each subject: $(10 \leq H_i \leq 50)$
- The fourth line contains N numbers A_i, the allowed number of hours to be absent for each subject: $(A_i < H_i)$

Output

For each test case, find the minimum sum of difficulties of exams Miler have to retake, and print the solution in one line following the format "Test 10 : 96"(without), if 10 is the test case number and 96 is the minimum sum of difficulties. If it is possible for Miler to be absent for M hours and not retaking any exam, the minimum sum of difficulties is 0.

Example

standard input	standard output

3
3 40
30 50 70
30 45 50
10 15 20
4 100
30 50 70 90
30 45 50 50
10 15 20 25
10 200
50 50 50 50 50 50 50 50 50 50
50 50 50 50 50 50 50 50 50 50
20 20 20 20 20 20 20 20 20 20
	Test 1: 0
	Test 2: 50
	Test 3: 0

Problem C. Miller and sequences

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	64 megabytes
Balloon Color:	`Orange`

Miller has a maths homework. He was given some sequences to determine if they are increasing or not. But being as lazy as he is, he doesn't want to do it himself.

So he comes to you, his computer science student friend, to help him determine if a sequence is increasing or not just by giving you a few value of the sequences.

Input

The first line of the input contains N, the number of values given for that sequence: $1 \leq N \leq 10^5$.

Then follow N space separated numbers representing the values given for that sequence: all numbers between -10^6 and 10^6

Output

For values given, print a single line: YES if the sequence is increasing NO otherwise

Examples

standard input	standard output
5 1 3 5 7 9	YES
3 0 -5 -1	NO

Problem D.

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	256 megabytes
Balloon Color:	`White`

While coach Fegla, the most famous coach in the Arab region, was preparing his student's for the ICPC 2019, he gave them the following problem.

Given a tree of N nodes in which each edge has an index between 1 and N. They have to answer Q questions. Each question has four parameters: L_i, R_i, u and v and they need to check if nodes u and v are connected if we use only edges with indices between L and R.

Ibrahim, a very clever student, missed the course of the trees. So he get stuck and need your help to answer these questions.

Can you help him ?

Input

First line contains an integer T ($1 \leq T \leq 100$) denoting the number of tests.

The first line of each test case contains two integers N and Q $(1 \leq N, Q \leq 10^5)$ representing respectively the number of nodes in the tree and the number of questions.

Each of next $N-1$ lines contains two integers u and v, representing an edge between u and v.

For each next Q lines contains four integers L, R, u and v as described above, where $(1 \leq L_i \leq R_i < N)$.

Output

For each query print "YES"(without quotes) if we use only edges with indices between L and R, nodes u and v still connected, otherwise print "NO"(without quotes).

Example

standard input	standard output

1
6 4
1 5
1 2
6 5
2 4
3 2
2 4 1 4
1 4 6 3
1 1 5 6
1 1 1 5
	YES
	NO
	NO
	YES

Problem E. World war II

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	256 megabytes
Balloon Color:	`Red`

During World War II Cryptography was used extensively, with a plethora of code and cipher systems fielded by the involved nations. One of the created enigmas was the Palindromic subsequence Code.

It was a clever method to exchange codes between Nazi Spies. The technique consists of sending a string S of length N. Then the receiver deciphers the message into numbers based on the given values of the characters. After that, a specialist looks for the biggest value of a palindromic subsequence within the given string. Finally, he delivers this number to the Reichsmarschall.

One of the Spies was captured after he delivered a string to his superiors since the spy was very close to one of the most known leaders of the country he may have leaked very important secrets and that message can cause a lot of deaths if it gets to the hands of the Reichsmarschall.

In order to know the real dangers ahead of the people, we must find out what was the code that the spy delivered to the Nazis.

Given the string S of length N, and the stolen characters' values. They asked you to write a code to tell the biggest value of a palindromic subsequence before it's too late.

Note that the value of a subsequence is the sum of values of its characters.

Input

The first line contains T, the number of test cases ($1 \leq T \leq 30$).

For each test case, the first line contains the length N of the string S, where $1 \leq N \leq 5000$.

The next line contains a string of lowercase English letters.

The next line contains 26 integers, representing the value v_i of each character starting from a to z, where $-10^5 \leq v_i \leq 10^5$.

Output

For each test case, print the maximum value of a palindromic string.

Example

standard input	standard output
3 4 abab 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 b 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 6 abcaab 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1	5 0 7

Note

A subsequence of a string is a string that can be obtained after deleting some (or all) characters of the original string. A palindrome is a string that can be read the same way, forwards and backward

Problem F. Joe and friends

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	32 megabytes
Balloon Color:	`Yellow`

It's Joe's birthday. His friend, Miller suggested to play a game: they sit in a circle, we suppose that they're numbered from 1 to N clockwise.

They take turns playing based on their position, first in order plays, then second... Each player, on their turn, touches the one on their left; the player who gets touched exits the game.

If you're out of the game, you skip all your future turns until the end of the current game. The game goes on until one player is left, the winner. Joe wants to know the position of the winner before even playing.

So given N, the number of players, can you tell the exact position the winner is sitting?

Input

The first line of input contains T, the number of test cases or games played: $(1 \leq T \leq 10^5)$.

Then follow T lines each containing one number, $(1 \leq N_i \leq 10^{15})$, the number of players for that test case.

Output

Print T lines, each one containing W_i, the exact position of the winner for that test case.

Example

standard input	standard output
4 5 9 10 15	3 3 5 15

Problem G. Nizar And Grades

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

Back in school, some has the best grade, some has the worst. Nizar Ketata, the most hard working volunteer in the TCPC's last season, was an average student.

He never wanted to have neither the best grade in the class nor the worst. He just believed that these grades will only get him into more troubles and will put him under spotlight.

One day Nizar got a glimpse of the grades' paper but he was not able to see which one was his grade since the teacher has come suddenly. But he memorized all the grades thanks to his good memory. Now he wants to know how many grades can please him from that paper.

There are N grades in the paper, you have to find the number of **different** grades than can please Nizar (can't be the best nor the worst in the class).

Input

First line contains an integer T ($1 \le T \le 100$) denoting the number of tests.

Each test is described as follows:

First line contains an integer N ($1 \le N \le 3 \ . \ 10^3$) denoting the number of grades.

Second line contains N space separated integers A_i ($1 \le A_i \le 10^6$) denoting the i^{th} grade.

Output

Print T lines where each line contains one integer S_i the number of different grades that would satisfy Nizar.

Example

standard input	standard output

1
5
1 2 3 4 5
	3

Problem H. Houda and Array Problem

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	256 megabytes
Balloon Color:	`Green`

Houda and her friends gathered around and came up with a really easy problem for people to solve . You are given an array of size N and you want to perform two types of operations on it

- Given L and R and a value V you need to report the number of integers that are strictly smaller than V
- Given i and V change the value of element at index i to value V

So are you up to the challenge ?

Input

The first line of input contains two integers $1 \leq N, M \leq 10^5$, size of the array and the number of queries.

Second line contains N integers $-10^{18} \leq a[i] \leq 10^{18}$, the given array.

M lines follow each contains a query description

- 1 L R V describing query of type 1
- 2 i V describing query of type 2

$-10^{18} \leq V \leq 10^{18}$

$1 \leq i, L, R \leq N$

Output

For each query of type 1 output the answer.

Example

`standard input`	`standard output`

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

Note

it is guaranteed that at least 1 query of type 1 exists