ACM-ICPC国际大学生程序设计竞赛北京赛区(2017)网络赛

报名参赛

已经结束

报名人数：2000

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题目1 : Visiting Peking University

时间限制: 1000ms
单点时限: 1000ms
内存限制: 256MB

描述

Ming is going to travel for n days and the date of these days can be represented by n integers: 0, 1, 2, …, n-1. He plans to spend m consecutive days (2 ≤ m ≤ n) in Beijing. During these m days, he intends to use the first day and another day to visit Peking university. Before he made his plan, Ming investigated on the number of tourists who would be waiting in line to enter Peking university during his n-day trip, and the results could be represented by an integer sequence p[i] (0 ≤ i ≤ n-1, p[i] represents the number of waiting tourists on day i). To save time, he hopes to choose two certain dates a and b to visit PKU(0 ≤ a < b ≤ n-1), which makes p[a] + p[b] as small as possible.

Unfortunately, Ming comes to know that traffic control will be taking place in Beijing on some days during his n-day trip, and he won't be able to visit any place in Beijing, including PKU, on a traffic control day. Ming loves Beijing and he wants to make sure that m days can be used to visit interesting places in Beijing. So Ming made a decision: spending k (m ≤ k ≤ n) consecutive days in Beijing is also acceptable if there are k - m traffic control days among those k days. Under this complicated situation, he doesn't know how to make the best schedule. Please write a program to help Ming determine the best dates of the two days to visit Peking University. Data guarantees a unique solution.

输入

There are no more than 20 test cases.

For each test case:

The first line contains two integers, above mentioned n and m (2 ≤ n ≤ 100, 2 ≤ m ≤ n).

The second line contains n integers, above mentioned p[0] , p[1] , … p[n-1]. (0 ≤ p[i] ≤ 1000, i = 0 ... n-1)

The third line is an integer q (0 ≤ q ≤ n), representing the total number of traffic control days during the n-day trip, followed by q integers representing the dates of these days.

输出

One line, including two integers a and b, representing the best dates for visiting PKU.

样例输入

```
7 3
6 9 10 1 0 8 35
3 5 6 2
4 2
10 11 1 2
1 2
```

样例输出

```
0 3
1 3
```

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题目2 : Reverse Suffix Array

时间限制: 1000ms
单点时限: 1000ms
内存限制: 256MB

描述

There is a strong data structure called "Suffix Array" which can effectively solve string problems.

Let $S=s_1s_2...s_n$ be a string and let S[i,j] denote the substring of S ranging from i to j. The suffix array A of S is now defined to be an array of integers providing the starting positions of suffixes of S in lexicographical order. This means, an entry A[i] is the starting position of the i-th smallest suffix in S and thus for all $1 < i \le n$: S[A[i-1], n] < S[A[i], n].

For example: the suffix array of “banana” is [6, 4, 2, 1, 5, 3].

Here comes another problem called "Reverse Suffix Array".

Given a suffix array, you need to figure out how many lower case strings are there whose suffix array is the same as the given suffix array.

输入

First line contains a positive number T which means the number of test cases.

For each test cases, first line contains a positive number N, the second line contains N integer(s) which indicates the suffix array A.

$1 \le T \le 10$, $1 \le N \le 100,000$

$1 \le A[i] \le N$ (i = 1...N)

输出

For each test case, output one line contains the answer. If no qualified string exists, output 0.

样例输入

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

样例输出

```
98280
```

比赛已经结束，去题库提交。 (https://hihocoder.com/problemset/problem/1579)

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题目3 : Matrix

时间限制: 1000ms
单点时限: 1000ms
内存限制: 256MB

描述

Once upon a time, there was a little dog YK. One day, he went to an antique shop and was impressed by a beautiful picture. YK loved it very much.

However, YK did not have money to buy it. He begged the shopkeeper whether he could have it without spending money.

Fortunately, the shopkeeper enjoyed puzzle game. So he drew a n × m matrix on the paper with integer value $a_{i,j}$ in each cell. He wanted to find 4 numbers x, y, x_2, and y_2($x \le x_2$, $y \le y_2$), so that the sum of values in the sub-matrix from (x, y) to (x_2, y_2) would be the largest.

To make it more interesting, the shopkeeper ordered YK to change exactly one cell's value into P, then to solve the puzzle game. (That means, YK must change one cell's value into P.)

If YK could come up with the correct answer, the shopkeeper would give the picture to YK as a prize.

YK needed your help to find the maximum sum among all possible choices.

输入

There are multiple test cases.

The first line of each case contains three integers n, m and P. ($1 \le n, m \le 300$, $-1000 \le P \le 1000$).

Then next n lines, each line contains m integers, which means $a_{i,j}$ ($-1000 \le a_{i,j} \le 1000$).

输出

For each test, you should output the maximum sum.

样例输入

```
3 3 4
-100 4 4
4 -10 4
4 4 4
3 3 -1
-2 -2 -2
-2 -2 -2
-2 -2 -2
```

样例输出

```
24
-1
```

比赛已经结束，去题库提交。 (https://hihocoder.com/problemset/problem/1580)

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已经结束

报名人数：2000

题目4：Agent Communication

时间限制：1000ms
单点时限：1000ms
内存限制：256MB

描述

In Peking University, there are many homeless cats. The students of cat club built n nests and some paths for those cats. A path connects two nests directly. All nests are connected by paths and there is only one route between any two nests.

Li Lei is the chief of the cat club. He just got some donation for the cats. So he decides to build a new path which connects two nests to make cats travel more easily. He hopes that after the new path is built, the maximum distance between two nests becomes as short as possible. The distance between two nests is defined as the number of paths along the route between two nests.

Can you help Li Lei to figure out how to build the new path?

输入

The first line of input contains an integer t(t ≤ 50), the number of test cases. Then t test cases follow.

For each case:

The first line of input contains an integer n(n ≤ 1000), the number of nests.

Among the next n-1 lines, each line contains two integer x and y (1 ≤ x, y ≤ n), meaning that there is a path between the x-th nest and the y-th nest.

输出

For each test case, output one integer, the maximum distance of two nests after the new path is built correctly.

样例提示

case 1: build a path between 1 and 5

case 2: build a path between 3 and 5

样例输入

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

样例输出

```
3
3
```

比赛已经结束，去题库提交。 (https://hihocoder.com/problemset/problem/1581)

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报名参赛

已经结束

报名人数：2000

题目5 : Territorial Dispute

时间限制: 1000ms
单点时限: 1000ms
内存限制: 256MB

描述

In 2333, the C++ Empire and the Java Republic become the most powerful country in the world. They compete with each other in the colonizing the Mars.

There are n colonies on the Mars, numbered from 1 to n. The i-th colony's location is given by a pair of integers (x_i, y_i). Notice that latest technology in 2333 finds out that the surface of Mars is a two-dimensional plane, and each colony can be regarded as a point on this plane. Each colony will be allocated to one of the two countries during the Mars Development Summit which will be held in the next month.

After all colonies are allocated, two countries must decide a border line. The Mars Development Convention of 2048 had declared that: A valid border line of two countries should be a straight line, which makes colonies of different countries be situated on different sides of the line.

The evil Python programmer, David, notices that there may exist a plan of allocating colonies, which makes the valid border line do not exist. According to human history, this will cause a territorial dispute, and eventually lead to war.

David wants to change the colony allocation plan secretly during the Mars Development Summit. Now he needs you to give him a specific plan of allocation which will cause a territorial dispute. He promises that he will give you 1000000007 bitcoins for the plan.

输入

The first line of the input is an integer T, the number of the test cases ($T \le 50$).

For each test case, the first line contains one integer n ($1 \le n \le 100$), the number of colonies.

Then n lines follow. Each line contains two integers x_i, y_i ($0 \le x_i, y_i \le 1000$), meaning the location of the i-th colony. There are no two colonies share the same location.

There are no more than 10 test cases with $n > 10$.

输出

For each test case, if there exists a plan of allocation meet David's demand, print "YES" (without quotation) in the first line, and in the next line, print a string consisting of English letters "A" and "B". The i-th character is "A" indicates that the i-th colony was allocated to C++ Empire, and "B" indicates the Java Republic.

If there are several possible solutions, you could print just one of them.

If there is no solution, print "NO".

注意

This problem is special judged.

样例输入

```
2
2
0 0
0 1
4
0 0
0 1
1 0
1 1
```

样例输出

```
NO
YES
ABBA
```

比赛已经结束，去题库提交。 (https://hihocoder.com/problemset/problem/1582)

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报名参赛

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题目6 : Cake

时间限制: 1000ms
单点时限: 1000ms
内存限制: 256MB

描述

To celebrate that WF-2018 will be held in PKU, Alice, Bob, and Cate are asked to make

N cakes.

Every cake i needs to go through 3 steps in restrict order:

1. Alice mixes flour and water for a_i minutes;

2. Bob carefully bakes it for b_i minutes;

3. Cate makes cream decoration for c_i minutes.

Since Cate wants to have different kinds of cakes, the third step of any cake i is always not less time-consuming than the second step of any cake j. Also, it is reasonable that once anyone starts to process a cake, the procedure cannot be stopped then be resumed.

To have these cakes done as soon as possible, they need your help.

输入

There are several cases (less than 15 cases).

The first line of every case contains an integer N ($1 \le N \le 10^5$)—the number of cakes to prepare.

After that, N lines follow, each of them contains three integers a_i, b_i and c_i ($1 \le i \le N$; $0 < a_i, b_i, c_i < 10^6$)—time that needs to be spent on the three steps of cake i respectively.

It is guaranteed that for any i and any j, b_i is no greater than c_j.

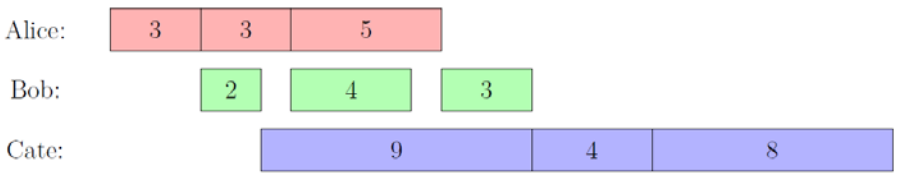
The input ends with N = 0.

输出

For every case, print in a single line the least possible time to make all cakes.

样例提示

One of the optimal solutions is to have Alice and Bob process cakes in order of 2, 3, 1, while Cate processes cakes in order of 2, 1, 3.



样例输入

```
3
5 3 4
3 2 9
3 4 8
0
```

样例输出

```
26
```

比赛已经结束，去题库提交。 (https://hihocoder.com/problemset/problem/1583)

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题目7 : Bounce

时间限制: 1000ms
单点时限: 1000ms
内存限制: 256MB

描述

For Argo, it is very interesting watching a circle bouncing in a rectangle.

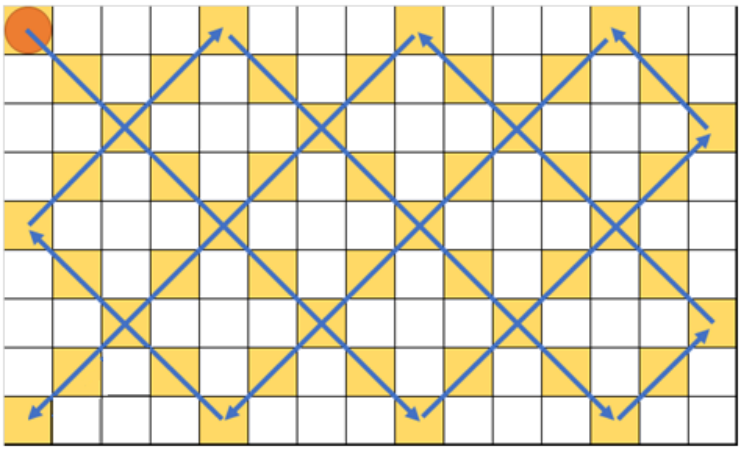
As shown in the figure below, the rectangle is divided into N×M grids, and the circle fits exactly one grid.

The bouncing rule is simple:

1. The circle always starts from the left upper corner and moves towards lower right.

2. If the circle touches any edge of the rectangle, it will bounce.

3. If the circle reaches any corner of the rectangle after starting, it will stop there.



Argo wants to know how many grids the circle will go through only once until it first reaches another corner. Can you help him?

输入

The input consists of multiple test cases. (Up to 10^5)

For each test case:

One line contains two integers N and M, indicating the number of rows and columns of the rectangle. ($2 \le N, M \le 10^9$)

输出

For each test case, output one line containing one integer, the number of grids that the circle will go through exactly once until it stops (the starting grid and the ending grid also count).

样例输入

```
2 2
2 3
3 4
3 5
4 5
4 6
4 7
5 6
5 7
9 15
```

样例输出

```
2
3
5
5
7
8
7
9
11
39
```

比赛已经结束，去题库提交。 (https://hihocoder.com/problemset/problem/1584)

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题目8 : Polynomial Product

时间限制: 3000ms
单点时限: 3000ms
内存限制: 256MB

描述

Mike wrote a program to calculate the product of two polynomials. The program is designed to handle non-negative integral coefficients with no more than w bits in binary representation. Using a sophisticated algorithm learnt from his grandmother, the program can run very fast.

However, he made a mistake. He accidentally uses a w-bit unsigned integral type to hold all the coefficients, even for the product, making it possible to overflow.

Mike finds it interesting to know given two polynomials, which terms in the product polynomial will overflow. And guess what? You are the one to solve his problem. Since w can be fairly large, only the length (in bits) of each coefficient will be given and you are only required to determine which terms in the product polynomial are likely to overflow. Here “likely” implies the assumption that multiplication will carry and addition will not carry. More specifically, you should respect the following rules while estimating the coefficients of the product:

1. A 0-bit number (should be 0) times a k-bit number will be a 0-bit number

2. A 1-bit number (should be 1) times a k-bit number will be a k-bit number

3. A j-bit number times a k-bit number (j,k>1) will be a (j+k)-bit number

4. A j-bit number plus a k-bit number will be a max(j,k)-bit number

输入

The first line contains a single integer T, indicating the number of test cases.

Each test case consists of 3 lines. The first line contains 3 integers n,m and w, where n and m are the degree of two polynomials. The second line consists of n integers $a_0 \ldots a_{n-1}$, where a_i indicates the length of the i-degree term’s coefficient in the first polynomial (in bits). The third line consists of m integers $b_0 \ldots b_{m-1}$, where b_i indicates the length of the i-degree term’s coefficient in the second polynomial (in bits).

T = 2017,

$0 < n, m \le 10^5$,

$0 < w < 2^{31}$,

$0 \le a_i, b_i < 2^{31}$.

For the first 2013 test cases, $0 < n+m \le 10^3$.

For the last 4 test cases, $0 < n+m \le 10^5$.

Note that a_i, b_i can be larger than w, which means the input itself overflows.

输出

For each test case, output one line with n+m-1 characters. The i-th (0 based) character is either ‘Y’ if the i-degree term is likely to overflow, or ‘N’ otherwise.

样例输入

```
2
3 2 4
1 2 3
3 2
3 2 6
1 2 3
3 2
```

样例输出

```
NYYY
NNNN
```

比赛已经结束，去题库提交。 (https://hihocoder.com/problemset/problem/1585)

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题目9 : Minimum

时间限制: 1000ms
单点时限: 1000ms
内存限制: 256MB

描述

You are given a list of integers a_0, a_1, …, a_{2^k-1}.

You need to support two types of queries:

1. Output $\text{Min}_{x,y\in[l,r]}\{a_x \cdot a_y\}$.

2. Let $a_x=y$.

输入

The first line is an integer T, indicating the number of test cases. ($1\le T\le 10$).

For each test case:

The first line contains an integer k ($0 \le k \le 17$).

The following line contains 2^k integers, a_0, a_1, …, a_{2^k-1} ($-2^k \le a_i < 2^k$).

The next line contains a integer ($1 \le Q < 2^k$), indicating the number of queries. Then next Q lines, each line is one of:

1. ***1 l r***: Output $\text{Min}_{x,y\in[l,r]}\{a_x \cdot a_y\}$. ($0 \le l \le r < 2^k$)

2. ***2 x y***: Let $a_x=y$. ($0 \le x < 2^k$, $-2^k \le y < 2^k$)

输出

For each query 1, output a line contains an integer, indicating the answer.

样例输入

```
1
3
1 1 2 2 1 1 2 2
5
1 0 7
1 1 2
2 1 2
2 2 2
1 1 2
```

样例输出

```
1
1
4
```

比赛已经结束，去题库提交。 (https://hihocoder.com/problemset/problem/1586)

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报名参赛

已经结束

报名人数：2000

题目10 : Typist's Problem

时间限制：2000ms
单点时限：2000ms
内存限制：256MB

描述

Mike typed the content of a paper document into a Word document. Unfortunately, his computer was attacked by a virus, and his Word document was corrupted. Mike doesn't want to type the whole document from beginning again. He wants to recover the document by modifying the corrupted one. The words in the document are changed by the virus, and Mike

wants to change the words back as quickly as possible. When changing a wrong word into a correct one, Mike can do 5 operations below:

1. Move the cursor left by one letter if the cursor is not on the left side of the left most letter.

2. Move the cursor right by one letter if the cursor is not on the right side of the right most letter.

3. Delete the letter on the right side of the cursor (If there is one).

4. Delete the letter on the left side of the cursor (If there is one).

5. Insert a letter on the right side of the cursor, and move the cursor to the right side of the newly inserted letter.

Operation 1 and 2 both take 0.5 second, and the other operations take one second.

There are some good restrictions:

1. Mike can't let the length of the word he is processing exceed 7 letters at any time.

2. There must be no duplicated letters in the word which Mike is processing at any time.

And to simplified the problem, a word here only consists of lower case letters 'a' to 'g', and its length is no more than 7 letters.

Please help Mike figure out how to do his job as quickly as possible.

输入

There are no more than 50 test cases.

Each test case is a line containing s1, k, and s2. s1 is the wrong word, k is the cursor position at the beginning, and s2 is the correct word. There are no duplicated letters in s1.

For a word of n letters, letters are numbered 0, 1, 2... n-1. The cursor can be on the left side of letter 0, on the right side of letter n-1, or between two letters. The left most position of the cursor is 0 and the right most position of the cursor is n. The given cursor position k is always valid.

输出

For each test case, print the minimum time (in seconds) it will take Mike to change the wrong word into the corresponding correct one. Keep a digit after the decimal point. If Mike can't do his job, print -1 instead.

样例输入

```
ab 2 a
adef 2 de
cefga 3 efd
```

样例输出

```
1.0
3.5
5.5
```

比赛已经结束，去题库提交。 (https://hihocoder.com/problemset/problem/1587)