

牛客网暑期ACM多校训练营（第二场）

一. 编程题

1. White Cloud is exercising in the playground.

White Cloud can walk 1 meters or run k meters per second.

Since White Cloud is tired, it can't run for two or more continuous seconds.

White Cloud will move L to R meters. It wants to know how many different ways there are to achieve its goal.

Two ways are different if and only if they move different meters or spend different seconds or in one second, one of them walks and the other runs.

输入描述：

The first line of input contains 2 integers Q and k . Q is the number of queries. ($Q \leq 100000, 1 \leq k \leq 100000$)

For the next Q lines, each line contains two integers L and R . ($1 \leq L \leq R \leq 100000$)

输出描述：

For each query, print a line which contains an integer, denoting the answer of the query modulo 1000000007.

示例1:

输入

3 3

3 3

1 4

1 5

输出

2

7

11

正确答案：

2. White Rabbit wants to buy some drinks from White Cloud.

There are n kinds of drinks, and the price of i -th drink is $p[i]$ yuan per bottle.

Since White Cloud is a good friend of White Rabbit, when White Rabbit buys a bottle of i -th drink, White Rabbit can choose one of the following two discounts:

1. White Rabbit can get a $d[i]$ ($d[i] \leq p[i]$) yuan discount. Specifically, White Rabbit only need to pay $p[i] - d[i]$ yuan.

2. White Rabbit can buy a bottle of $f[i]$ -th drink for free.

White Rabbit wants to have at least a bottle of i -th drink for each i between 1 to n . You need to tell White Rabbit what is the minimal cost.

输入描述：

The first line of input contains an integer n ($n \leq 100000$)

In the next line, there are n integers $p[1..n]$ in range $[0, 1000000000]$.

In the next line, there are n integers $d[1..n]$ in range $[0, 1000000000]$. ($d[i] \leq p[i]$)

In the next line, there are n integers $f[1..n]$ in range $[1, n]$.

输出描述：

Print the minimum cost.

示例1:

输入

3

10 3 5

5 0 5

1 3 2

输出

8

正确答案：

3. There is an infinite plane. White Cloud has n lines which are not parallel to the Oy axis. These lines in the plane are in the form $y = ax + b$.

White Rabbit will have a trip in the plane. It will start at time 0 and go straight along a line. Specifically, White Rabbit uses 2 parameters C and D , denoting that at time x , White Rabbit is at the position $(x, C \cdot x + D)$. If at some time, White Rabbit is located at one of White Cloud's lines, White Cloud will receive a message immediately.

White Rabbit has m pairs $(C[i], D[i])$ for $i = 1..m$. For each $i = 1..m$, White Cloud wants to know if White Rabbit uses $(C[i], D[i])$, when is the last time White Cloud can receive a message.

输入描述：

The first line of input contains an integer n . ($n \leq 50000$)

For the next n lines, the i -th line contains 2 integers $A[i]$, $B[i]$, describing the i -th line. ($-1e9 \leq A[i], B[i] \leq 1e9$)

All numbers $A[i]$ are different.

The next line contains an integer m . ($m \leq 50000$)

For the next m lines, the i -th line contains 2 integers $C[i]$, $D[i]$, describing the i -th pair. ($-2e9 \leq C[i], D[i] \leq 2e9$)

Each $C[j]$ is different from any of the numbers $A[i]$.

Each $D[j]$ is different from any of the numbers $B[i]$.

输出描述：

Print m lines. The i -th line contains a real number with at least 6 digits after the decimal point, denoting the latest time White Cloud can receive a message. Your answer must be correct within an absolute error of $1e-6$.

If White Cloud can't receive any message during White Rabbit's trip, print a string "No cross".

示例1:

输入

2

0 -1

1 2

3

-1 4

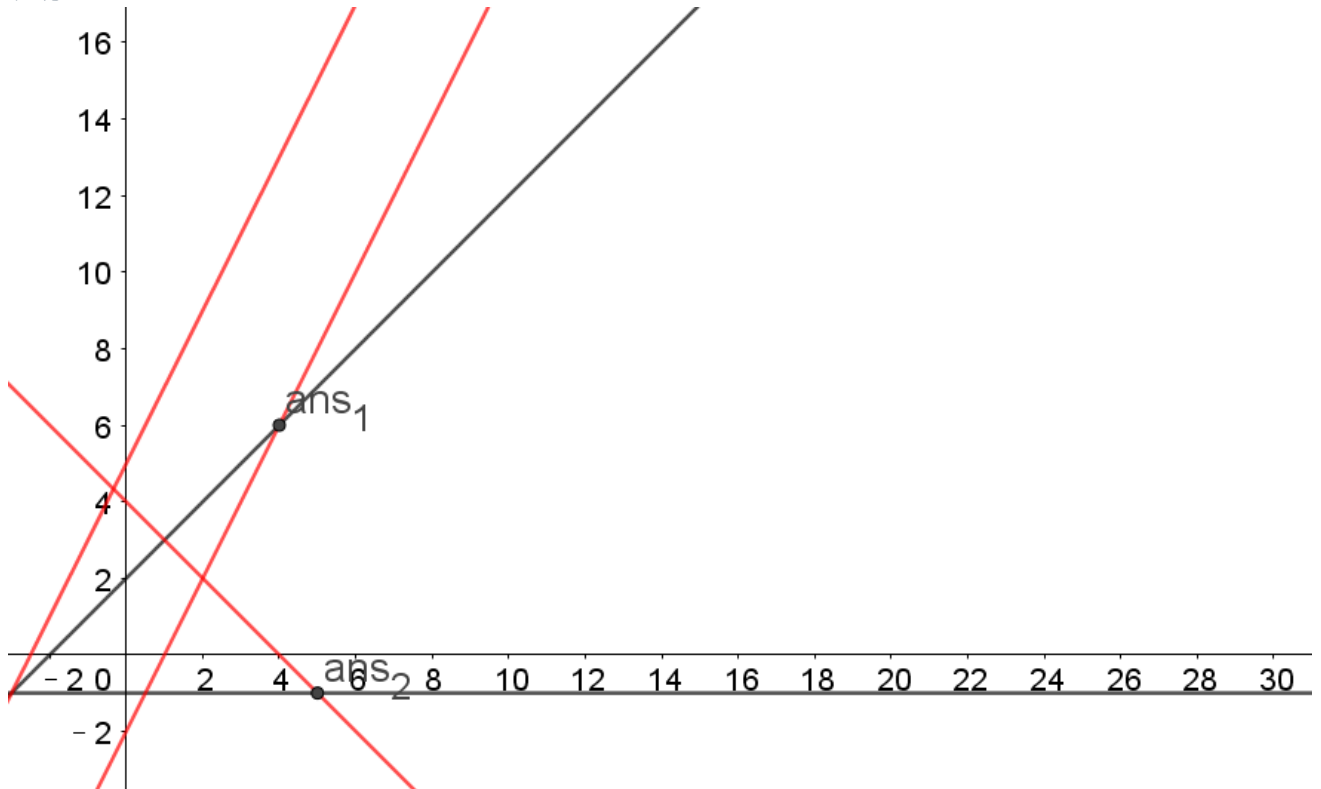
2 -2

2 5

输出

5.0000000000000000
4.0000000000000000
No cross

说明



正确答案：

4. White Cloud has built n stores numbered from 1 to n .
White Rabbit wants to visit these stores in the order from 1 to n .
The store numbered i has a price $a[i]$ representing that White Rabbit can spend $a[i]$ dollars to buy a product or sell a product to get $a[i]$ dollars when it is in the i -th store.
The product is too heavy so that White Rabbit can only take one product at the same time.
White Rabbit wants to know the maximum profit after visiting all stores.
Also, White Rabbit wants to know the minimum number of transactions while getting the maximum profit.
Notice that White Rabbit has infinite money initially.

输入描述：

The first line contains an integer $T(0 < T \leq 5)$, denoting the number of test cases.
In each test case, there is one integer $n(0 < n \leq 100000)$ in the first line, denoting the number of stores.
For the next line, There are n integers in range $[0, 2147483648)$, denoting $a[1..n]$.

输出描述：

For each test case, print a single line containing 2 integers, denoting the maximum profit and the minimum number of transactions.

示例1:

输入

1

5
9 10 7 6 8
输出
3 4

正确答案：

5. There is a tree with $n(n \leq 100000)$ nodes. The root is a node with number 1.
The i -th node has a value $val[i](0 < val[i] < 1000000000 + 7)$.
Define the value of a connected component as the product of each node's value.
White Cloud has 3 types of operation.
The first operation is to change a node's value.
The second operation is to change a node's father.
The third operation is to give 2 integers b and c , denoting querying the sum of value of all connected components which contains node b of size c .

输入描述：

The first line of input contains 2 integers n and m .
In the next line, there are n integers, denoting $val[1..n]$.
In the next line, there are $n-1$ integers, denoting the father from the 2-th node to the n -th node.
In the next m lines, the first number a is the type of operation.
if $a=0$, the next 2 integers b and $c(1 \leq b \leq n, 0 < c < 1e9+7)$ denote changing the value of b to c .
if $a=1$, the next 2 integers b and $c(1 \leq b, c \leq n, c$ is not in the subtree of $b)$ denote changing the father of b to c .
if $a=2$, the next 2 integers b and $c(1 \leq b \leq n, 0 < c \leq 10)$ denote querying the sum of value of all connected components which contains node b of size c .

输出描述：

For each operation, if $a=2$, print a single line containing the answer modulo $1000000000+7$.

示例1:

输入
3 3
1 2 3
1 1
2 1 2
2 1 3
2 2 3
输出
5
6
6

正确答案：

6. White Rabbit is a businessman. It has n warehouses. The i -th warehouse is located at $(x1[i], y1[i])$ and has $a[i]$ units of products initially.
There will be m orders coming in order.
When the i -th order is coming, White Rabbit will drive to $s[i]$ warehouses from $x[i][0]$ to $x[i][S[i]-1]$ in order.

More specifically, White Rabbit will drive to the $x[i][0]$ -th warehouse first(the car is empty before arriving at $x[i][0]$ -th warehouse), and move any number of products to the car.

Then White Rabbit will drive to the $x[i][1]$ -th warehouse. When arriving at $x[i][1]$ -th warehouse, White Rabbit can put any number of products from the warehouse on the car or from the car on the warehouse. After leaving the $x[i][s[i]-1]$ -th warehouse, White Rabbit will go to the house of the customer and sell all of the rest products in the car to the customer. The house of i -th customer is located at $(x2[i],y2[i])$.

Besides, the i -th customer has a limit $lim[i]$, denoting that the number of products White Rabbit gives the i -th customer can't be larger than $lim[i]$.

White Rabbit wants to maximize the number of products it sells.

White Cloud wants to interfere White Rabbit. White Cloud has installed k Jammers. The i -th Jammer is located at $(x3[i],y3[i])$. It works on a circle with radius $r[i]$. If the connecting segments of two points are tangent or intersecting with the circle, the contact of two points will be disturbed.

To keep contact with the i -th customer, White Rabbit will skip $x[i][t]$ -th($0 \leq t < s[i]$) warehouse if the $x[i][t]$ -th warehouse can't contact the house of i -th customer.

White Rabbit wants to know the maximum number of products it can sell.

输入描述：

The first line of input contains 3 integers n,m,k ($n \leq 1000, m \leq 1000, k \leq 10$).

For the next n lines, each line contains 3 integers $x1[i], y1[i], a[i]$.

For the next k lines, each line contains 3 integers $x3[i], y3[i], r[i]$.

For the next m lines, the i -th line contains $4+s[i]$ integers $x2[i], y2[i], s[i], lim[i]$ and $s[i]$ different numbers.

All the number in input is in range $[0, 1000000000]$.

The input ensure that the location of customers' homes and warehouses is not within the coverage of any jammer.

输出描述：

Print the maximum number of products White Rabbit can sell.

示例1:

输入

```
3 3 1
1 1 5
4 5 0
9 2 7
2 2 1
4 4 2 3 1 2
0 9 2 3 1 2
9 1 2 8 3 2
```

输出

```
11
```

正确答案：

7. White Cloud placed n containers in sequence on a axes. The i -th container is located at $x[i]$ and there are $a[i]$ number of products in it.

White Rabbit wants to buy some products. The products which are required to be sold must be placed in the same container.

The cost of moving a product from container u to container v is $2 * \text{abs}(x[u] - x[v])$.

White Cloud wants to know the maximum number of products it can sell. The total cost can't exceed T .

输入描述：

The first line of input contains 2 integers n and T($n \leq 500000, T \leq 1000000000000000000$)

In the next line there are n increasing numbers in range $[0, 1000000000]$ denoting $x[1..n]$

In the next line there are n numbers in range $[0, 10000]$ denoting $a[1..n]$

输出描述：

Print an integer denoting the answer.

示例1:

输入

2 3

1 2

2 3

输出

4

正确答案：

8. White Cloud has a tree with n nodes. The root is a node with number 1. Each node has a value.

White Rabbit wants to travel in the tree 3 times. In Each travel it will go through a path in the tree.

White Rabbit can't pass a node more than one time. It wants to know the maximum sum value of all nodes it passes through.

输入描述：

The first line of input contains an integer n($3 \leq n \leq 400001$)

In the next line there are n integers in range $[0, 1000000]$ denoting the value of each node.

For the next n-1 lines, each line contains two integers denoting the edge of this tree.

输出描述：

Print one integer denoting the answer.

示例1:

输入

13

10 10 10 10 10 1 10 10 10 1 10 10 10

1 2

2 3

3 4

4 5

2 6

6 7

7 8

7 9

6 10

10 11

11 12

11 13

输出

110

正确答案：

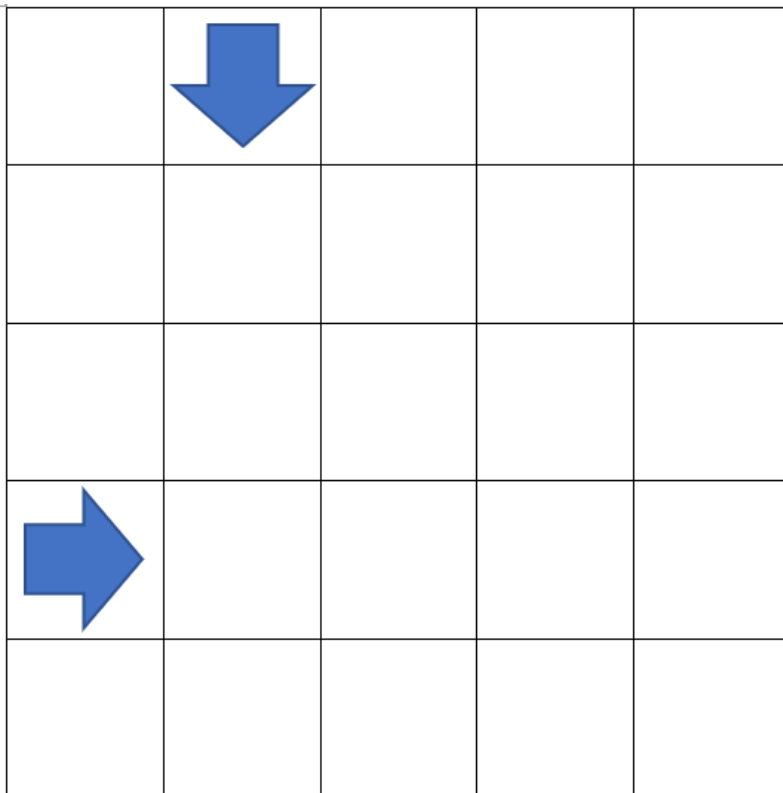
9. White Cloud has a square of $n \times n$ from (1,1) to (n,n).

White Rabbit wants to put in several cars. Each car will start moving at the same time and move from one side of one row or one line to the other. All cars have the same speed. If two cars arrive at the same time and the same position in a grid or meet in a straight line, both cars will be damaged.

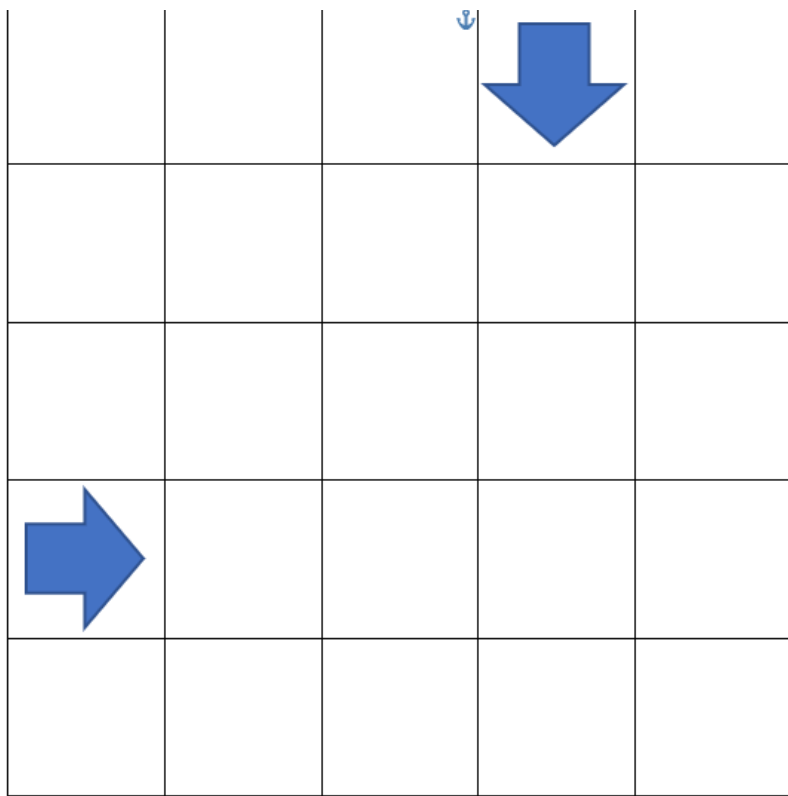
White Cloud will destroy the square m times. In each step White Cloud will destroy one grid of the square. Any car will break when it enters a damaged grid.

White Rabbit wants to know the maximum number of cars that can be put into to ensure that there is a way that allows all cars to perform their entire journey without damage.

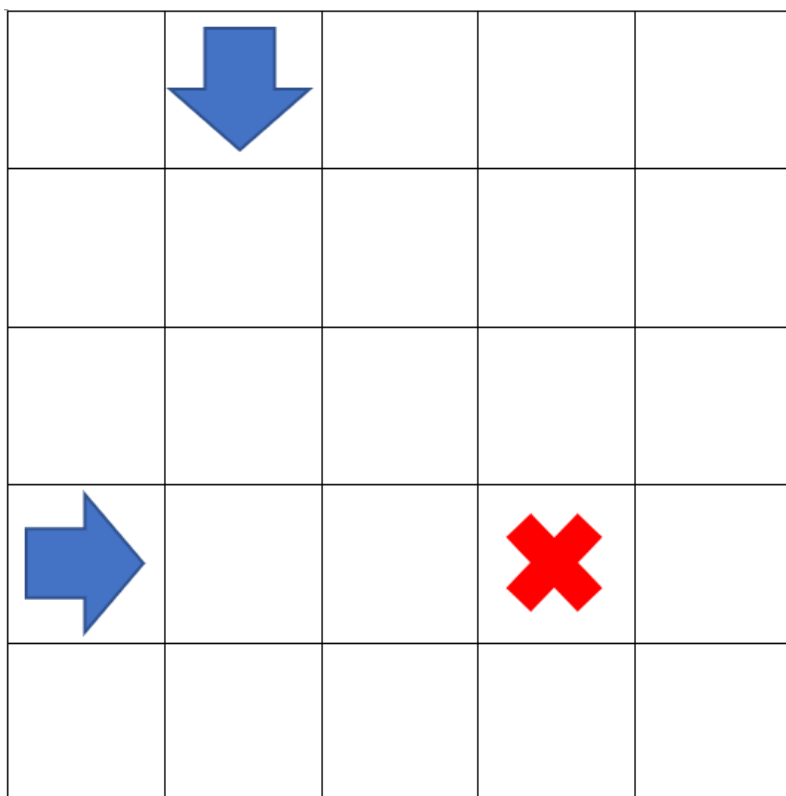
For example, in a 5×5 square



legal



illegal (These two cars will collide at (4,4))



illegal (One car will go into a damaged grid)

输入描述：

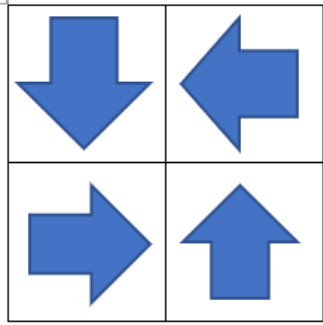
The first line of input contains two integers n and m($n \leq 100000, m \leq 100000$)

For the next m lines, each line contains two integers x,y ($1 \leq x, y \leq n$), denoting the grid which is damaged by White Cloud.

输出描述：

Print a number, denoting the maximum number of cars White Rabbit can put into.

备注



示例1:

输入

2 0

输出

4

正确答案：

10. White Rabbit has a rectangular farmland of $n*m$. In each of the grid there is a kind of plant. The plant in the j -th column of the i -th row belongs the $a[i][j]$ -th type.

White Cloud wants to help White Rabbit fertilize plants, but the i -th plant can only adapt to the i -th fertilizer. If the j -th fertilizer is applied to the i -th plant ($i \neq j$), the plant will immediately die.

Now White Cloud plans to apply fertilizers T times. In the i -th plan, White Cloud will use $k[i]$ -th fertilizer to fertilize all the plants in a rectangle $[x1[i]...x2[i]][y1[i]...y2[i]]$.

White rabbits wants to know how many plants would eventually die if they were to be fertilized according to the expected schedule of White Cloud.

输入描述：

The first line of input contains 3 integers n, m, T ($n*m \leq 1000000, T \leq 1000000$)

For the next n lines, each line contains m integers in range $[1, n*m]$ denoting the type of plant in each grid.

For the next T lines, the i -th line contains 5 integers

$x1, y1, x2, y2, k$ ($1 \leq x1 \leq x2 \leq n, 1 \leq y1 \leq y2 \leq m, 1 \leq k \leq n*m$)

输出描述：

Print an integer, denoting the number of plants which would die.

示例1:

输入

2 2 2

1 2

2 3

1 1 2 2 2

2 1 2 1 1

输出

3

正确答案：

11. White Cloud has a rectangle carpet of $n*m$. Grid (i, j) has a color $colorA[i][j]$ and a cost $costA[i][j]$.

White Rabbit will choose a subrectangle B of $p \times q$ from A and the color of each grid is $\text{colorB}[0 \dots p-1][0 \dots q-1]$, the cost of B is the (maximum number in the corresponding subrectangle of $\text{costA} \times (p+1) \times (q+1)$). Then colorB is continuously translated and copied in an infinite times, that is, expand colorB into an infinite new matrix, colorC, which satisfies $\text{colorC}[i][j] = \text{colorB}[i \bmod p][j \bmod q]$. White Rabbit must ensure that colorA is a subrectangle of colorC. You need to find the minimum cost way.

输入描述：

The first line of input contains two integers $n, m (0 < n \times m \leq 1000000)$

For the next line of n lines, each line contains m lowercase English characters, denoting colorA.

For the next line of n lines, each line contains m integers in range $[0, 1000000000]$, denoting costA.

输出描述：

Print the minimum cost.

示例1:

输入

2 5

acaca

acaca

3 9 2 8 7

4 5 7 3 1

输出

18

说明

choose subrectangle $\text{colorA}[1 \dots 1][3 \dots 4] = \text{ca}$, After copying unlimited copies

colorC=

cacacacaca ...

cacacacaca ...

cacacacaca ...

cacacacaca ...

cacacacaca ...

.....

colorA is a subrectangle of colorC

the cost is $\max(3, 1) \times (1+1) \times (2+1)$.

正确答案：