Codeforces Beta Round #24

A. Ring road

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Nowadays the one-way traffic is introduced all over the world in order to improve driving safety and reduce traffic jams. The government of Berland decided to keep up with new trends. Formerly all n cities of Berland were connected by n two-way roads in the ring, i. e. each city was connected directly to exactly two other cities, and from each city it was possible to get to any other city. Government of Berland introduced one-way traffic on all n roads, but it soon became clear that it's impossible to get from some of the cities to some others. Now for each road is known in which direction the traffic is directed at it, and the cost of redirecting the traffic. What is the smallest amount of money the government should spend on the redirecting of roads so that from every city you can get to any other?

Input

The first line contains integer n ($3 \le n \le 100$) — amount of cities (and roads) in Berland. Next n lines contain description of roads. Each road is described by three integers a_i, b_i, c_i ($1 \le a_i, b_i \le n$, $a_i \ne b_i$, $1 \le c_i \le 100$) — road is directed from city a_i to city b_i, redirecting the traffic costs c_i.

Output

Output single integer — the smallest amount of money the government should spend on the redirecting of roads so that from every city you can get to any other.

Sample test(s)

input
```
3
1 3 1
1 2 1
3 2 1
```
output
```
1
```

input
```
3
1 3 1
1 2 5
3 2 1
```
output
```
2
```

input
```
6
1 5 4
5 3 8
2 4 15
1 6 16
2 3 23
4 6 42
```
output
```
39
```

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

B. F1 Champions

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Formula One championship consists of series of races called Grand Prix. After every race drivers receive points according to their final position. Only the top 10 drivers receive points in the following order 25, 18, 15, 12, 10, 8, 6, 4, 2, 1. At the conclusion of the championship the driver with most points is the champion. If there is a tie, champion is the one with most wins (i.e. first places). If a tie still exists, it is chosen the one with most second places, and so on, until there are no more place to use for compare.

Last year another scoring system was proposed but rejected. In it the champion is the one with most wins. If there is tie, champion is the one with most points. If a tie still exists it is proceeded the same way as in the original scoring system, that is comparing number of second, third, forth, and so on, places.

You are given the result of all races during the season and you are to determine the champion according to both scoring systems. It is guaranteed, that both systems will produce unique champion.

Input

The first line contain integer t ($1 \le t \le 20$), where t is the number of races. After that all races are described one by one. Every race description start with an integer n ($1 \le n \le 50$) on a line of itself, where n is the number of clasified drivers in the given race. After that n lines follow with the classification for the race, each containing the name of a driver. The names of drivers are given in order from the first to the last place. The name of the driver consists of lowercase and uppercase English letters and has length at most 50 characters. Comparing of names should be case-sensetive.

Output

Your output should contain exactly two line. On the first line is the name of the champion according to the original rule, and on the second line the name of the champion according to the alternative rule.

Sample test(s)

input

```
3
3
Hamilton
Vettel
Webber
2
Webber
Vettel
2
Hamilton
Vettel
```

output

```
Vettel
Hamilton
```

input

```
2
7
Prost
Surtees
Nakajima
Schumacher
Button
DeLaRosa
Buemi
8
Alonso
Prost
NinoFarina
JimClark
DeLaRosa
Nakajima
Patrese
Surtees
```

output

```
Prost
Prost
```

Note

It is not guaranteed that the same drivers participate in all races. For the championship consider every driver that has participated in at least one race. The total number of drivers during the whole season is not more then 50.

C. Sequence of points

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given the following points with integer coordinates on the plane: $M_0, A_0, A_1, ..., A_{n-1}$, where n is odd number. Now we define the following infinite sequence of points M_i: M_i is symmetric to M_{i-1} according $A_{(i-1) \mod n}$ (for every natural number i). Here point B is symmetric to A according M, if M is the center of the line segment AB. Given index j find the point M_j.

Input

On the first line you will be given an integer n ($1 \le n \le 10^5$), which will be odd, and j ($1 \le j \le 10^{18}$), where j is the index of the desired point. The next line contains two space separated integers, the coordinates of M_0. After that n lines follow, where the i-th line contain the space separated integer coordinates of the point A_{i-1}. The absolute values of all input coordinates will not be greater then 1000.

Output

On a single line output the coordinates of M_j, space separated.

Sample test(s)

input
3 4 0 0 1 1 2 3 -5 3
output
14 0

input
3 1 5 5 1000 1000 -1000 1000 3 100
output
1995 1995

D. Broken robot

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You received as a gift a very clever robot walking on a rectangular board. Unfortunately, you understood that it is broken and behaves rather strangely (randomly). The board consists of N rows and M columns of cells. The robot is initially at some cell on the i-th row and the j-th column. Then at every step the robot could go to some another cell. The aim is to go to the bottommost (N-th) row. The robot can stay at it's current cell, move to the left, move to the right, or move to the cell below the current. If the robot is in the leftmost column it cannot move to the left, and if it is in the rightmost column it cannot move to the right. At every step all possible moves are equally probable. Return the expected number of step to reach the bottommost row.

Input

On the first line you will be given two space separated integers N and M ($1 \leq N, M \leq 1000$). On the second line you will be given another two space separated integers i and j ($1 \leq i \leq N, 1 \leq j \leq M$) — the number of the initial row and the number of the initial column. Note that, $(1, 1)$ is the upper left corner of the board and (N, M) is the bottom right corner.

Output

Output the expected number of steps on a line of itself with at least 4 digits after the decimal point.

Sample test(s)

input
10 10 10 4

output
0.0000000000

input
10 14 5 14

output
18.0038068653

E. Berland collider

time limit per test: 1.5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Recently the construction of Berland collider has been completed. Collider can be represented as a long narrow tunnel that contains n particles. We associate with collider 1-dimensional coordinate system, going from left to right. For each particle we know its coordinate and velocity at the moment of start of the collider. The velocities of the particles don't change after the launch of the collider. Berland scientists think that the big bang will happen at the first collision of particles, whose velocities differs in directions. Help them to determine how much time elapses after the launch of the collider before the big bang happens.

Input

The first line contains single integer n ($1 \le n \le 5 \cdot 10^5$) — amount of particles in the collider. Next n lines contain description of particles. Each particle is described by two integers x_i, v_i ($-10^9 \le x_i, v_i \le 10^9, v_i \neq 0$) — coordinate and velocity respectively. All the coordinates are distinct. The particles are listed in order of increasing of coordinates. All the coordinates are in meters, and all the velocities — in meters per second. The negative velocity means that after the start of collider the particle will move to the left, and the positive — that the particle will move to the right.

Output

If there will be no big bang, output `-1`. Otherwise output one number — how much time in seconds elapses after the launch of the collider before the big bang happens. Your answer must have a relative or absolute error less than 10^{-9}.

Sample test(s)

input

```
3
-5 9
0 1
5 -1
```

output

```
1.0000000000000000000
```

input

```
6
1 3
2 3
3 3
4 -3
5 -1
6 -100
```

output

```
0.02912621359223301065
```