Problem A. Anaconda

Memory limit: 1024 MB

Nicki Minaj has an array a of n integers $[a_1, a_2, ..., a_n]$, where every integer is 0 initially. On the i-th day, she performs the action (l_i, r_i), where $1 \leq l_i \leq r_i \leq n$. The action will add 1 modulo n to every element in the subarray $[a_{l_i}, ..., a_{r_i}]$. Formally, the action (l, r) does exactly the following: for every i such that $l \leq i \leq r$, set a_i to $(a_i + 1) \mod n$.

Help Nicki Minaj calculate the sum of every integer in a after every action.

Input

Each input file contains only one testcase.

The first line of each testcase has 2 integers n, q, the size of the array and the number of days (actions).

Then there are q lines of actions, the ith of which has two integers l_i r_i.

The input constraints:

- $2 \leq n \leq 10^5$
- $1 \leq q \leq 10^5$
- $1 \leq l_i \leq r_i \leq n$ for each action

Output

For the ith action, output one line containing a single integer, that is the sum of the array a after performing the 1st, ..., ith action(s).

Example

Standard Input	Standard Output
5 5 1 3 2 3 3 3 3 5 3 5	3 5 6 9 7
3 5 1 1 2 2 3 3 1 3 1 3	1 2 3 6 0

Note

For example 1:

- a after 1st action: $[1, 1, 1, 0, 0]$
- a after 2nd action: $[1, 2, 2, 0, 0]$
- a after 3rd action: $[1, 2, 3, 0, 0]$
- a after 4th action: $[1, 2, 4, 1, 1]$
- a after 5th action: $[1, 2, 0, 2, 2]$

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Problem B. Killing Machine

Memory limit: 1024 MB

The whole class 3-E is outside for PE class, except for Ritsu, who cannot participate because she is a machine. Out of boredom, she decides to clean the classroom.

The classroom can be represented as a 2D array having n rows and m columns. In the i-th row, there is one table placed horizontally, occupying column $l_i ... r_i$ of that row ($1 \leq l_i \leq r_i \leq m$). In one move, she can shift some table to the right or left by one column. She wants to know for each column, what is the minimum moves she needs so that she can make the column clear. A column is clear if it is not occupied in any row.

Note that the tables are initially placed within the classroom, and must stay within the classroom after each move. Also, there may be some column that is impossible to clear.

Input

Each input file contains only one testcase.

The first line of each testcase has 2 integers n, m.

Then are n lines, the ith of which has 2 integers l_i, r_i.

- $1 \leq n, m \leq 2 \times 10^5$
- $1 \leq l_i \leq r_i \leq m$ for each i

Output

Output m integer $ans_1, ans_2, ..., ans_m$, where ans_i is the minimum number of moves to clear column i. If ith column cannot be cleared, then $ans_i = -1$.

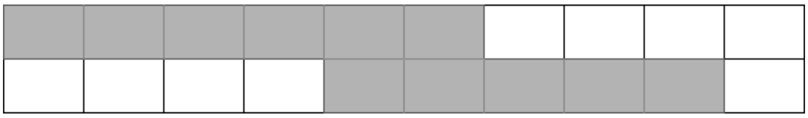
Example

Standard Input	Standard Output
`1 5` `2 3`	`0 1 1 0 0`

`2 10`
`1 6`
`5 9`
	`1 2 3 4 -1 -1 3 2 1 0`

Note

The initial array for example 2, with the occupied positions colored gray:



To clear the 3rd column, the way that takes the minimum moves is to shift the table at 1st row 3 columns to the right. Therefore, $ans_3 = 3$.

Problem C. Pole of Inaccessibility

Memory limit: 1024 MB

If you want to isolate yourself, you can try to visit some pole of inaccessibility. The oceanic pole of inaccessibility is the place in the ocean that is farthest from land.

In fact, the oceanic pole of inaccessibility lies in the South Pacific Ocean (48°52.5 S 123°23.6 W), 2,688 km from the nearest lands. The area is so remote that—as with any location more than 400 kilometres from an inhabited area—sometimes the closest human beings are astronauts aboard the International Space Station when it passes overhead.

The area is also known as a ”spacecraft cemetery” because hundreds of decommissioned satellites, space stations, and other spacecraft have been deposited there upon re-entering the atmosphere to lessen the risk of hitting inhabited locations or maritime traffic. Point Nemo is relatively lifeless; its location within the South Pacific Gyre blocks nutrients from reaching the area, and being so far from land it gets little nutrient run-off from coastal waters.

In this problem, let try find the oceanic pole of inaccessibility on a map. The map is an $n \times m$ matrix. For each location, 1 represents here is an island and 0 represents an ocean.

The **manhattan distance** $(\Delta x + \Delta y)$ is used to calculate the distance of two point. Can you find the oceanic pole of inaccessibility on the map?

Because maybe there are many pole of inaccessibility on a map, please answer the distance from oceanic pole of inaccessibility to the closest island.

Input

There will be only one testcase per input file.

The first line contains two positive integers, n, m.

The next part is a map. The next n line, each line contains m integers. 1 is meaning an island and 0 is an ocean.

- $1 \leq n, m \leq 500$
- The is at least one island and one ocean on the map.

Output

Output a single integer, the distance from the oceanic pole of inaccessibility to the closest island.

Examples

Standard Input	Standard Output
3 5 1 1 0 0 0 1 0 0 1 0 1 1 0 0 1	2

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Problem D. Matsuri

Memory limit: 1024 MB

It is time to hold Watanagashi (some kind of matsuri or festival) for Hinamizawa. Rika, the miko of the village want hire some villagers to prepare the matsuri.

There are n works to do , so Rika found **exactly** n villagers for help. However, The abilities for villagers are different. It is meaning if Rika asked i-th villager to finish j-th would have different payment, let use $C_{i,j}$ to represent the payment.

If each villagers would be assigned **exactly** 1 **different** work, can you help Rika to find the minimum cost of payment to finish all works?

Input

Each input file contains only one testcase.

The first line has 1 integers n.

The next n lines, each line has n integers. The j-th integer on the i-th line is meaning the $C_{i,j}$.

- $1 \leq n \leq 500$
- $0 \leq C_{i,j} \leq 500$

Output

Print the minimum cost of payment to finish all works.

Examples

Standard Input	Standard Output
3 2 3 3 3 2 3 3 3 2	6

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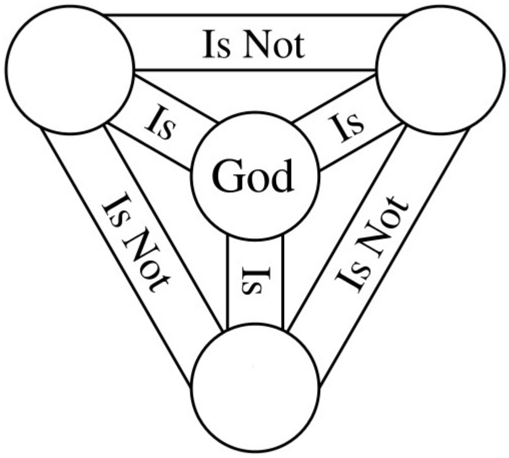
Problem E. Trinitas

Memory limit: 1024 MB

Do you know what is Trinitas? The Christian doctrine of the Trinity holds that God is one God, and exists in the form of three coeternal and consubstantial persons: the Father, the Son (Jesus Christ), and the Holy Spirit. The three persons are distinct, yet are one "substance, essence or nature" (homoousios). In this context, a "nature" is what one is, whereas a "person" is who one is.



However, even you are not a Christian, You have learned that 3 noncollinear points can determine a circle such that those points are on the edge of it. And the **diameter squared** (d^2) of the circle is meaning the size of the world. Give you the location of 3 noncollinear points, can you answer the size of the world?

Input

Each input file contains only many testcase.

For one testcase contain 3 lines. each line has two integers x, y which meaning the coordinate of the point.

- no more than 50000 testcases in a file
- $-100 \leq x, y \leq 100$

Output

Output the world size in a floating point and round it with 3 decimal places.

Examples

Standard Input	Standard Output
0 5 -4 -3 4 -3 1 5 2 8 0 0	25.000 1105.000

Note

The Center of circle for case 1 is $(0, 0)$. The Center of circle for case 2 is $(33, -4)$.

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Problem F. Hosting a Parking Lot

Memory limit: 1024 MB

Hosting a parking lot may be one of the easiest ways to make money. People drive into it, occupy a parking space, and pay depending on how much time they stay.

Our parking lot hosting is very easy: First, a car drives into the parking lot, and this "entering" event is labeled with a unique hash code, with a timestamp. Once the car exits the parking lot, the hash code of its entering is fetched, and the exiting timestamp is recorded.

In this problem, you will receive a record of all entering/exiting events of the parking lot, and you have to calculate the total duration of all occupancies.

The parking lot must be empty at both the beginning and end of the whole period.

Input

You will receive a list which records all entering and exiting events of the parking lot. Each record is listed with 3 information separated by spaces: Type, Hash Code, and the Timestamp.

There are 2 syntaxes denoting the types of events. "N" means entering and "X" means exiting.

The unique hash code is composed of 10 characters, and each character is a hexadecimal representation form 0 to 9 and a to f.

The timestamp is an integer of the UNIX timestamp, which is the number of seconds since 1970/1/1.

The whole record is sorted by the timestamps. There must be exactly an exiting event following each entering event, with shared hash codes. There are at most 400,000 records.

Output

Print a line with an integer presents the total duration of all occupancies in seconds. The answer must be less than 10^{15}.

Examples

Standard Input	Standard Output
N dd75db928b 1606668288 N 0f20116a09 1635985784 X dd75db928b 1652941316 N 73e3ab4405 1657682729 X 0f20116a09 1666454678 X 73e3ab4405 1669856698	88915891

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Problem G. Power Network

Memory limit: 1024 MB

In the island of Nawiat, the power network is unstable. There are N power plants connected by $N-1$ wires. Electric power can be transmitted from any power plant to another through the wires. If a power plant or a wire malfunctions, the power network is down.

To prevent power outage, you are asked to maintain the power plants and wires. You are going to install monitors on the power plants. When installed with a monitor, you are allowed to see the health condition of the power plant itself, the wires connected to the power plant, and the neighboring power plants (the power plants that are connected directly with one wire).

The configuration of monitors must meet at least one of the following plans. Two configurations are considered different if the set of power plants installed with monitors differs.

- Plan A: Install monitors so that you can see conditions of all power plants
- Plan B: Install monitors so that you can see conditions of all wires

Since you are not well paid, so you don't care about minimizing the number of installed monitors. Also you don't want to propose a configuration that meets both plan A and plan B. Given the structure of the power network, please output the number of configurations that meet ONLY plan A or plan B.

Input

The first line contains an integer N. Then $N-1$ lines follows, each line contains two integers p, q, meaning that p-th power plant is connected to q-th power plant with a wire.

- $1 \le N \le 10^5$
- $1 \le p, q \le N$

Output

Please output a single integer denoting the answer. Since the number may be large, please mod it by $10^9 + 7$.

Examples

Standard Input	Standard Output
4 1 2 2 3 3 4	1
4 1 2 1 3 1 4	0

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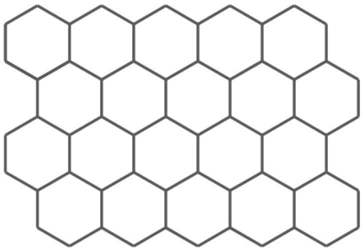
Problem H. Hive

Memory limit: 1024 MB

Bob is a bee that lives in a narrow bee hive. Inside the hive is a hexagonal grid with R rows and C columns. Each hexagon is indexed as a (i, j) pair, meaning that it is the i-th counting from the top and j-th counting from the left. Two hexagons are adjacent if they share an edge. For example the following is a hexagonal grid with 4 rows and 5 columns:



One hexagon is a room in the bee hive, for example, a living room, a kitchen, a party room, etc. There are four special rooms in the bee hive, nectar storage, nectar factory, honey storage, and honey factory. Bob wants to build one pipe from nectar storage to nectar factory and another pipe from honey storage to honey factory. The pipe starts in one room, passes through adjacent rooms, and finally ends in another room. Due to technical issues, there can only be at most one pipe in a room, which means that if a pipe is already built in a room, another pipe cannot be built in the room.

The cost of building pipe in rooms varies. For example, building pipe in the kitchen may be easy, but building pipe in the party room may be troublesome. Given the index of four special rooms and the cost of building pipe in each room, please output the minimum total cost to build the two pipes.

Input

The first line is an integer N, being the number of datasets. Each in the following format:

$$\begin{array}{ccccc} R & C & & & \\ r_1 & c_1 & r_2 & c_2 & \\ r_3 & c_3 & r_4 & c_4 & \\ x_{1,1} & x_{1,2} & x_{1,3} & \cdots & x_{1,C} \\ x_{2,1} & x_{2,2} & x_{2,3} & \cdots & x_{2,C} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_{R,1} & x_{R,2} & x_{R,3} & \cdots & x_{R,C} \end{array}$$

R is the number of rows and C is the number of columns. (r_1, c_1) is the position of nectar storage. (r_2, c_2) is the position of nectar factory. (r_3, c_3) is the position of honey storage. (r_4, c_4) is the position of honey factory. Each integer $x_{i,j}$ denotes the cost to build pipe in room (i, j).

- $1 \leq N \leq 8$
- $1 \leq R \leq 10$
- $1 \leq C \leq 5$
- $1 \leq r_1, r_2, r_3, r_4 \leq R$
- $1 \leq c_1, c_2, c_3, c_4 \leq C$
- (r_1, c_1), (r_2, c_2), (r_3, c_3), (r_4, c_4) are pairwise distinct

- $0 \le x_{i,j} \le 1000$, for $1 \le i \le R$ and $1 \le j \le C$

Output

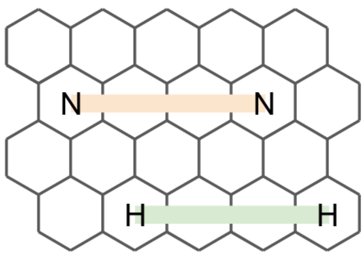
For each dataset, please output the minimum total cost, or -1 if it is impossible to build the two pipes.

Examples

Standard Input	Standard Output
3 4 5 2 1 2 4 4 2 4 5 10 10 10 10 10 0 1 1 0 10 10 10 10 10 10 10 0 1 1 0 5 5 1 1 5 5 1 5 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 5 5 3 1 3 3 2 4 5 5 5 2 2 2 2 2 2 2 1 1 1 5 1 1 1 9 3 9 9 9 2 0 2 1 1	4 -1 18

Note

For the first dataset: This is a 4×5 hexagonal grid. 'N's denote nectar storage and factory. 'H's denote honey storage and factory. The pipes with minimum total cost are shown in orange and green.



Problem I. Sidewalk

Memory limit: 1024 MB

A sidewalk is a path along the side of a road. It is usually constructed of concrete or asphalt, it is designed for pedestrians. Sidewalks play an important role in transportation, as they provide a safe path for people to walk along that is separated from the motorized traffic. They aid road safety by minimizing interaction between pedestrians and motorized traffic. Sidewalks are normally in pairs, one on each side of the road, with the center section of the road for motorized vehicles.

However, the sidewalk in Taiwan is always blocked by something, such as vehicle, flowerpot, vendors or no parking sign. To give pedestrians a safety environment, we need to **remove all items** that block the sidewalk. Give you the status of the sidewalk, can you calculate at least how much to items remove if a pedestrians want to walk on sidewalk form position x to position y?

Input

It has many request for each testcase.

The first line has a integer n, it is meaning the length of the sidewalk.

The next line has n integers, $a_1, a_2, \cdots a_n$. a_i is meaning how many items on the position i.

The next line has a integer Q, It meaning there are Q request. For each request, has 2 integer x, y in a line.

- $1 \leq n, q \leq 10000$
- $1 \leq x, y \leq n$
- $0 \leq a_i \leq 100$

Output

Print a line with an integer for each request presents at least how much to items remove if a pedestrians want to walk on sidewalk form position x to position y.

Examples

Standard Input	Standard Output
6 0 0 1 2 1 0 3 1 4 2 2 3 2	3 0 1

Problem J. Image Rotation

Memory limit: 16 MB

Image processing is one of the fundamental fields in computer science. One common operation is to rotate the 2-D image.

In this problem, you will get a 2-D array, which denotes the given image. The size of the image is always 16×16, and each pixel in it must be one of the English letters a-z.

For the given input, please rotate it 90 degree in clockwise direction. Can you finish the task and print the outcome?

Input

There are 16 lines, and each line contains 16 lowercase English letters.

Output

Print the new image after rotation.

Examples

Standard Input	Standard Output
aaaaaaaaaaaaaaaa	ponmlkjihgfedcba
bbbbbbbbbbbbbbbb	ponmlkjihgfedcba
cccccccccccccccc	ponmlkjihgfedcba
dddddddddddddddd	ponmlkjihgfedcba
eeeeeeeeeeeeeeee	ponmlkjihgfedcba
ffffffffffffffff	ponmlkjihgfedcba
gggggggggggggggg	ponmlkjihgfedcba
hhhhhhhhhhhhhhhh	ponmlkjihgfedcba
iiiiiiiiiiiiiiii	ponmlkjihgfedcba
jjjjjjjjjjjjjjjj	ponmlkjihgfedcba
kkkkkkkkkkkkkkkk	ponmlkjihgfedcba
llllllllllllllll	ponmlkjihgfedcba
mmmmmmmmmmmmmmmm	ponmlkjihgfedcba
nnnnnnnnnnnnnnnn	ponmlkjihgfedcba
oooooooooooooooo	ponmlkjihgfedcba
pppppppppppppppp	ponmlkjihgfedcba

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