CodeVita Season 8 – Pre-Qualifier Zonal Round Questions

Distribute Books

Problem Description

For enhancing the book reading, school distributed story books to students as part of the Children's day celebrations.

To increase the reading habit, the class teacher decided to exchange the books every weeks so that everyone will have a different book to read. She wants to know how many possible exchanges are possible.

If they have 4 books and students, the possible exchanges are 9. Bi is the book of i-th student and after the exchange he should get a different book, other than Bi.

B1 B2 B3 B4 - first state, before exchange of the books

B2 B1 B4 B3

B2 B3 B4 B1

B2 B4 B1 B3

B3 B1 B4 B2

B3 B4 B1 B2

B3 B4 B2 B1

B4 B1 B2 B3

B4 B3 B1 B2

B4 B3 B2 B1

Find the number of possible exchanges, if the books are exchanged so that every student will receive a different book.

Constraints

1<= N <= 1000000

Input Format

Input contains one line with N, indicates the number of books and number of students.

Output

Output the answer modulo 1000000007.

Test Case

Explanation

Example 1

Input

4

Output

9

Min Combinations

Problem Description

Alexander The great, while roaming the stretch of Turkey, came across a wise man.

He asked the wise man, "Who is the greatest conqueror of all?". The wise man replied, "A person with great strength and intelligence. Whosoever can solve my puzzle will go on to become the greatest!". The puzzle is as follows; Given two integers 'n1' and 'n2', select two integers 'a' and 'b', such as to solve the equation (n1 * a + n2 * b = x). But there is a catch, 'x' is the smallest positive integer which satisfies the equation. Can you help Alexander become the greatest?

Constraints

1 <= T <= 1000

-10^7 <= a, b <= 10^7

0 <= n1, n2 <= 10^7

Input Format

The first line contains the number of Test cases T.

Next T lines contains two space-separated integers, n1 and n2.

Output

Print the value of x.

Test Case

Explanation

Example 1

Input

1

34818 45632

Output

2

Explanation

Given n1 = 34818 and n2 = 45632, if we choose a = 3553 and b = -2711, we get

=> n1 * a + n2 * b = x

=> 34818 * 3553 + 45632 * (-2711)

=> 2

Note: No other value of a and b, within the range, will give smaller value than 2.

Balancing Stars

Problem Description

CODU loves to play with string of brackets.

He considers string as a good string if it is balanced with stars. A string is considered as balanced with stars if string contains balanced brackets and between every pair of bracket i.e. between opening and closing brackets, there are at least 2 stars(*) present. CODU knows how to check whether a string is balanced or not but this time he needs to keep a track of stars too. He decided to write a program to check whether a string is good or not. But CODU is not as good in programming as you are, so he decided to take help from you. Will you help him for this task? You need to print Yes and number of balanced pair if string satisfies following conditions(string is good if it satisfies following 2 conditions):

1. The string is balanced with respect to all brackets.

2. Between every pair of bracket there is at least two stars.

However if string doesn't satisfies above conditions then print No and number of balanced pair in string as an output.

Constraints

4 <= String length <= 1000

Input Format

The first and only line of input contains a string of characters(a-z,A-Z), numbers(0-9), brackets('{', '[', '(', ')', ']', '}') and stars(*).

Output

Print space separated "Yes" (without quotes) and number of balanced pair if string is good. Else print "No" (without quotes) and number of balanced pair.

Test Case

Explanation

Example 1

Input

{**}

Output

Yes 1

Explanation

Here string contains one balanced pair {} and between this pair of bracket there are 2 stars present so the output is Yes with the count of balanced pair as 1.

Example 2

Input

{**(**{**[**]})}

Output

Yes 4

Explanation

String has balanced brackets and also satisfies 2nd condition. So the output is Yes with count of balanced pair which is 4.

Example 3

Input

**}xasd[**]sda231

Output

No 1

Explanation

In this case string is not balanced. So the output is No with the count of balanced pair as 1.

Market Survey

Problem Description

Market Research firm is carrying out a survey regarding popular brands. The person who has the best pulse of the survey population will be rewarded by the firm.

The survey comprises of N questions was taken by M participants, not at the same time but one after the other. Clearly, there is no correct answer since it is a survey of brands. Each question can have only four options (1,2,3,4). Most expected answers to different questions is used as a template to measure brand popularity. Think of this as a default answer sheet where the question paper is the Survey.

'0' represents no answer to a question. Thus it means that the participant has skipped answering that question.

Right Answer:

For a particular question, the highly chosen option till that point of time is treated as the correct answer. If multiple options have the same count, then out of those options the one which was chosen recently is treated as the right answer.

Score of a Participant:

One point will be awarded for each right answer. No negative points for wrong answers.

Instant Result:

This is shared to the Participant instantly after completion of his/her exam. (this is equal to number of right answers)

Final Result:

Only the final top scorer(TOPPER) is announced along with his score.

Note:

At the end of all M Participants completing the exam, the final right answers gets decided.

Based on these answers score of each candidate gets recalculated and the one with highest score is the TOPPER!!!

If more than one Participant gets the top score then the one among them who attempted the exam first, is treated as TOPPER.

Constraints

1 <= N,M <= 1000

Input Format

First line contains N (number of questions)

Second line contains M (number of Participants)

Third line contains N integers separated with space (default answers)

Next M lines contains N integers separated with space (response of M participants)

Output

First M lines showing the instant results of each Participant.

Last line containing the TOPPER’s id and his score

(assume id’s start with 1)

Test Case

Explanation

Example 1

Input

10

2

1 2 3 4 1 2 3 4 1 2

1 2 4 4 3 2 3 1 1 3

2 3 4 4 1 2 3 1 1 2

Output

6

6

1 8

Explanation

Number of questions = 10

Number of Participants = 2

Default answers : 1 2 3 4 1 2 3 4 1 2

(Latest Key is same as Default answers)

First Participant answers : 1 2 4 4 3 2 3 1 1 3

Right answers : 6 (= Instant result of first Participant)

Latest Key : 1 2 4 4 3 2 3 1 1 3

Second Participant's answers : 2 3 4 4 1 2 3 1 1 2

Right answers : 6 (= Instant result of second Participant)

Latest Key : 1 2 4 4 1 2 3 1 1 2

Final key : 1 2 4 4 1 2 3 1 1 2

(Final Key is same as Latest Key at the end of all Participants completing the exam)

Right answers of Participant1 = Right answers of Participant2 = 8.

So topper is first Participant with score 8.

Angels vs Devils

Problem Description

In a board game (12x12) of Angels vs Devils, various devils try to kill an angel whose aim is to get across the board. Person playing for devil can place 3 devils at any cell on the board, each devil has different powers.

Starting point of Angel can only be on border but not corners of the board and will be provided as input. He will walk in a straight line (horizontal or vertical only) across the board, one cell every second. For example, if he is placed on the left border he will move right towards the right border. Starting points and types of devils will be provided as input, their powers are as follows (please also refer the image in Example 1).

OGRE (O): He cannot move but he can kill with his breath. His powers change with time.

· In 1st second Ogre can kill angel if the angel reaches Ogre's location

· In 2nd second Ogre can kill angel surrounding upto 8 neighbouring cells (see diagram)

· In 3rd second Ogre can kill angel if the angel reaches Ogre's location

· In 4th second Ogre is powerless i.e. even if angel reaches Ogre's location, Ogre cannot harm him

XiXi (X): He has the power to kill an angel only if both the following conditions are true

· He is active

· Angel is on same colored cell as XiXi

XiXi is active only for 1 particular second in this game. According to Figure 1, XiXi is on cell D8. What this means is – XiXi will be active only in 8th second and if and only if angel is on blue colored square at 8th second, XiXi can kill the angel.

ZeeSNAKE (Z): He leaves a poison trail and moves in 'Z' shape. His first move is 'down' and then 'right' and keeps on making a trail in that order until he reaches the border. If he reaches the 'Bottom Border' he starts moving 'up' instead of 'down' and vice-versa. If he reaches the 'Right Border' he starts moving 'left' instead of 'right' and vice-versa. Angel coming on the poison box will die immediately. Trail created by him till 12th second is shown in Figure 1

You need to provide the box number on which the Angel gets killed, or output 'SS' if Angel successfully crosses the board

Constraints

Angel starts from the border but not from the corners (i.e. cells A1, A12, L1 and L12)

Starting points of angel and all the devils will be different

Powers of devils do not conflict. Thus if an angel reaches a cell which is under influence of more than one devil's power, the angel will still get killed

Angel cannot stop, he has to move every second

Input Format

First Line contains the starting point of Angel at t = 1.

Second Line contains the types of devils in order delimited by comma (,).

Third Line contains starting points of devils (at t = 1) in order delimited by comma (,).

Output

Cell number where the angel gets killed, if angel does not get killed then print "SS"

Test Case

Explanation

Example 1

Input

K12

O,X,Z

I3,D8,C4

Output

K5

Explanation

Angel will be killed by the Devil XiXi as at the 8th second, he can kill angel on blue boxes

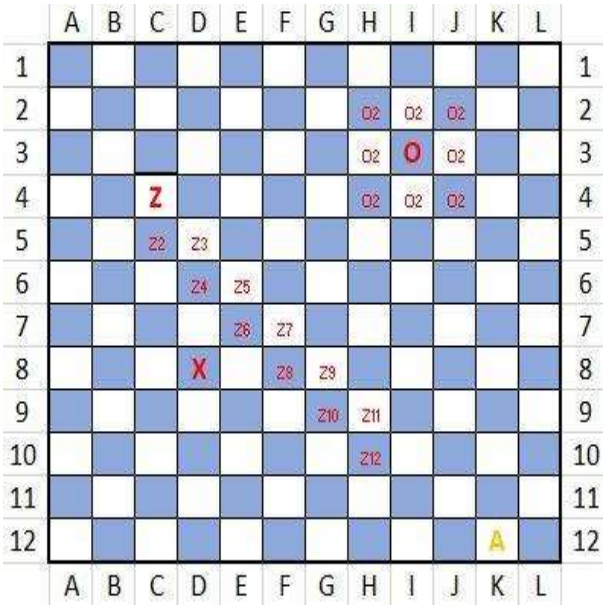


Figure. 1.

Example 2

Input

I12

Z,O,X

K2,B10,G3

Output

SS

Explanation

Angel is successfully saved because no devil’s power is able to harm him.

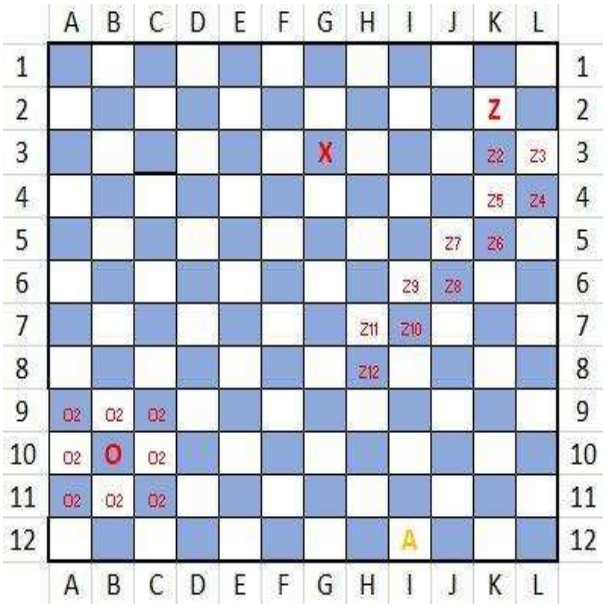


Figure. 2.

Grooving Monkeys

Problem Description

N monkeys are invited to a party where they start dancing. They dance in a circular formation, very similar to a Gujarati Garba or a Drum Circle. The dance requires the monkeys to constantly change positions after every 1 second.

The change of position is not random & you, in the audience, observe a pattern. Monkeys are very disciplined & follow a specific pattern while dancing.

Consider N = 6, and an array monkeys = {3,6,5,4,1,2}.

This array (1-indexed) is the dancing pattern. The value at monkeys[i], indicates the new of position of the monkey who is standing at the ith position.

Given N & the array monkeys[ ], find the time after which all monkeys are in the initial positions for the 1st time.

Constraints

1<=t<=10 (test cases)

1<=N<=10000 (Number of monkeys)

Input Format

First line contains single integer t, denoting the number of test cases.

Each test case is as follows -

Integer N denoting the number of monkeys.

Next line contains N integer denoting the dancing pattern array, monkeys[].

Output

t lines,

Each line must contain a single integer T, where T is the minimum number of seconds after which all the monkeys are in their initial position.

Test Case

Explanation

Example 1

Input

1

6

3 6 5 4 1 2

Output

6

Explanation

Consider N = 6, and an array monkeys = {3,6,5,4,1,2}.

Suppose monkeys are a,b,c,d,e,f, & Initial position (at t = 0) -> a,b,c,d,e,f

At t = 1 -> e,f,a,d,c,b

a will move to 3rd position, b will move to 6th position, c will move to 5th position, d will move to 4th position, e will move to 1st position and f will move to 2nd position. Thus from a,b,c,d,e,f at t =0, we get e,f,a,d,c,b at t =1. Recursively applying same transpositions, we get following positions for different values of t.

At t = 2 -> c,b,e,d,a,f

At t = 3 -> a,f,c,d,e,b

At t = 4 -> e,b,a,d,c,f

At t = 5 -> c,f,e,d,a,b

At t = 6 -> a,b,c,d,e,f

Since at t = 6, we got the original position, therefore the answer is 6.

Iterate Base

Problem Description

Given a number representation, we can identify the base that would result in a least value for the representation. Consider the following examples:

1. For the number representation 11, the least possible base is 2 and hence the least possible value is 3 in base 10.

2. For 17, the least possible base is 8 and the least possible value is 15 in base 10.

3. For 1729, the least possible base in 10 and the least possible value is 1729 in base 10.

Consider doing this base reduction iteratively till a fixed point is reached as shown in the following example: Let's start with number representation 72. The least possible value of 72 is in base 8 and is 58 (represented in base 10). Iterating, the least possible value of 58 is in base 9 and is 53 (base 10). In the next iteration, 53 (in base 6) becomes 33. Then, 33 (base 4) gives 15; 15 (base 6) gives 11; 11 (base 2) gives 3. Finally, 3 remains 3 (in bases 4 and above).

Write a program to accept a number representation, perform the successive base reductions as above and print the resulting final number.

Constraints

1. The length of input number representation <= 5

2. Maximum base = 36

3. Symbols used for digits: Base 2: 0, 1
Base 3: 0, 1, 2
...
Base 11: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A

…

Base 36: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z

4. Face values for symbols: Symbol => Value 0 => 0
1 => 1
2 => 2
….
9 => 9
A => 10
B => 11
….
Z => 35

Input Format

One line containing a number representation (See Examples section for better understanding)

Output

The final number representation that results from iteratively performing base reductions in the manner illustrated above

Test Case

Explanation

Example 1

Input

25

Output

3

Explanation

Starting with 25, we have the following transitions: 25 -> base 6 => 17 -> base 8 => 15 -> base 6 => 11 -> base 2 => 3, which is the fixed point

Example 2

Input

TCS

Output

17900

Explanation

Starting with TCS, TCS -> base 30 => 29*30^2+12*30+28=26488 -> base 9 => 2*9^4+6*9^3+4*9^2+8*9+8=17900 -> base 10 => 17900, which is the fixed point

Philaland Coin

Problem Description

The problem solvers have found a new Island for coding and named it as Philaland.

These smart people were given a task to make purchase of items at the Island easier by distributing various coins with different value.

Manish has come up with a solution that if we make coins category starting from $1 till the maximum price of item present on Island, then we can purchase any item easily. He added following example to prove his point.

Lets suppose the maximum price of an item is 5$ then we can make coins of {$1, $2, $3, $4, $5} to purchase any item ranging from $1 till $5.

Now Manisha, being a keen observer suggested that we could actually minimize the number of coins required and gave following distribution {$1, $2, $3}. According to him any item can be purchased one time ranging from $1 to $5. Everyone was impressed with both of them.

Your task is to help Manisha come up with minimum number of denominations for any arbitrary max price in Philaland.

Constraints

1<=T<=100

1<=N<=5000

Input Format

First line contains an integer T denoting the number of test cases.

Next T lines contains an integer N denoting the maximum price of the item present on Philaland.

Output

For each test case print a single line denoting the minimum number of denominations of coins required.

Test Case

Explanation

Example 1

Input

2

10

5

Output

4

3

Explanation

For test case 1, N=10.

According to Manish {$1, $2, $3,... $10} must be distributed.

But as per Manisha only {$1, $2, $3, $4} coins are enough to purchase any item ranging from $1 to $10. Hence minimum is 4. Likewise denominations could also be {$1, $2, $3, $5}. Hence answer is still 4.

For test case 2, N=5.

According to Manish {$1, $2, $3, $4, $5} must be distributed.

But as per Manisha only {$1, $2, $3} coins are enough to purchase any item ranging from $1 to $5. Hence minimum is 3. Likewise denominations could also be {$1, $2, $4}. Hence answer is still 3.

King Placement

Problem Description

This is a typical chess game where your opponent first places random number of Knights, Rooks, Bishop and Queens on an N*N chess board and then you have to place your king safely on chess board such that it should not be under attack by any piece.

Note: if you don't know how to play chess and how chess pieces moves, please refer below link (you can concentrate only on how the above mentioned pieces moves).

https://www.instructables.com/id/Playing-Chess/

Given an N*N chessboard with K number of Knights, R number of Rooks, B number of Bishops and Q number of queens. Your task is to find out number of squares on the chess board such that your King is not checked by any of your opponents pieces.

Constraints

2<=N<=50

0<=K+R+B+Q <=N*N

0<=i, j <=N-1

Input Format

First line provides an integer N

Next line contains K, no. of Knights. Next K lines provide 2 space separated integers denoting the rank and the file of the Knights (i,j)

Next line contains R, no. of Rooks. Next R lines provide 2 space separated integers denoting the rank and the file of the Rooks (i,j)

Next line contains B, no. of Bishops. Next B lines provide 2 space separated integers denoting the rank and the file of the Bishops (i,j)

Next line contains Q, no. of Queens. Next Q lines provide 2 space separated integers denoting the rank and the file of the Queens (i,j)

Output

Number of squares where King can be placed safely.

Test Case

Explanation

Example 1

Input

4

2

0 0

1 1

1

2 2

0

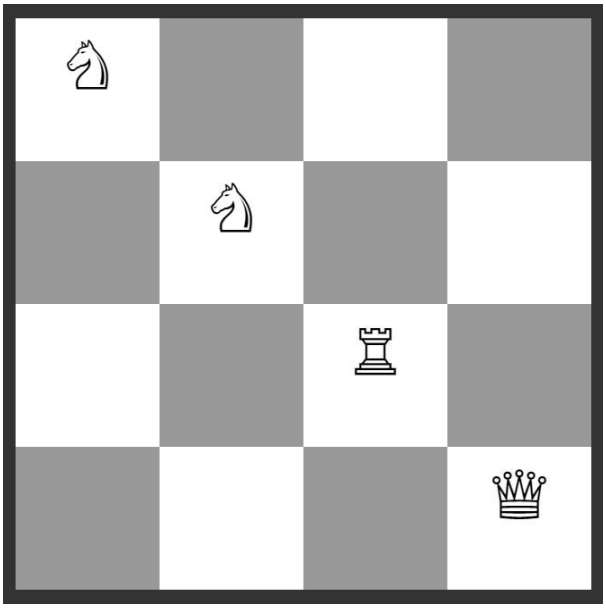
1

3 3

Output

2

Explanation



The image shows the arrangement of the pieces. After the placement of all the Pieces as per the input chess board looks like the image above,

You can place King in 2 places safely. i.e., (0,1) and (1,0)

Example 2

Input

8

4

2 6

3 2

5 6

7 7

4

2 2

4 6

6 4

7 5

4

0 4

1 1

1 6

5 1

2

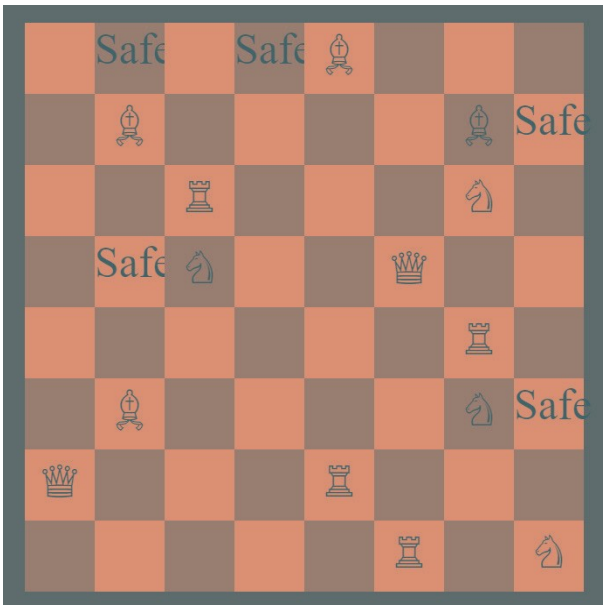
3 5

6 0

Output

5

Explanation



Glass Piece

Problem Description

A square glass sheet of size 'S' cm fell down and broken down into N+1 pieces.

A man collected the broken pieces and he is trying to arrange the pieces to get the original shape. He found that exactly one piece is missing. To find the exact position of the missing piece, he noted down all (x,y) coordinates of each broken piece. Please help him to find the coordinates of the missing piece.

Note 1 : The input order of corners of known glass pieces are in the clockwise direction starting from the corner having least X value. If more than one corners having the same least X value, then start from the corner having least X and least Y value.

Note 2 : The corners of missing glass piece should output in the clockwise direction starting from the corner having least X value. If more than one corners have same least X value, then start from the corner having least X and least Y value.

Constraints

1 < S <= 1000.

1 < N <= 50.

Input Format

First line contains an integer, S, size of Glass Sheet.

Second line contains an integer, N.

Next N lines contain set of space separated integers indicates the details of N known glass pieces as follows:

· First number indicates total corners of that glass piece - say i,

· followed by 2 * i integers denotes X and Y coordinates of i corners, delimited by space

Output

Coordinates of missing piece in (X,Y) format separated by spaces.

Test Case

Explanation

Example 1

Input

400

3

5 0 0 200 0 400 200 100 250 0 250

3 200 0 400 0 400 200

4 100 250 400 200 400 400 200 400

Output

(0,250) (100,250) (200,400) (0,400)

Explanation

The size of the square glass plate is 400 cm * 400 cm. The glass plate broke into 4 pieces and he got 3 pieces.

He placed first glass piece as below figure:

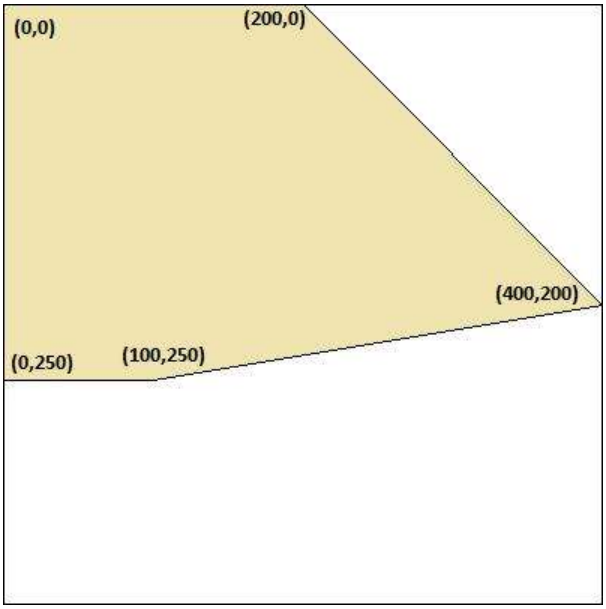


Figure. 1

Next he placed second glass piece as below figure:

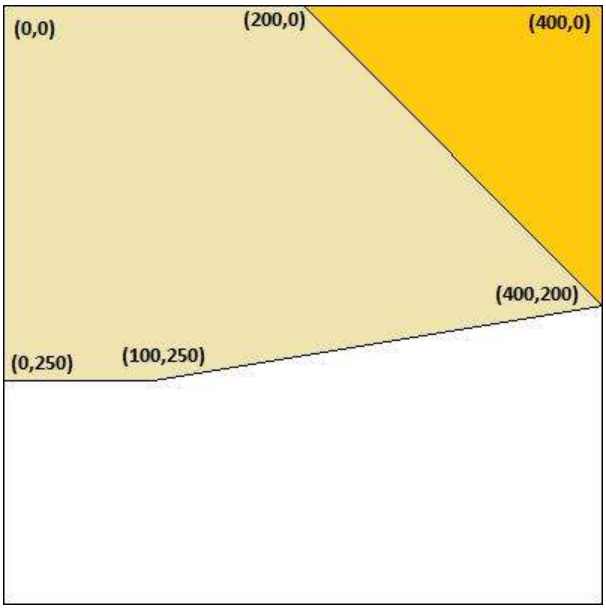


Figure. 2

Next he placed third glass piece as below figure:

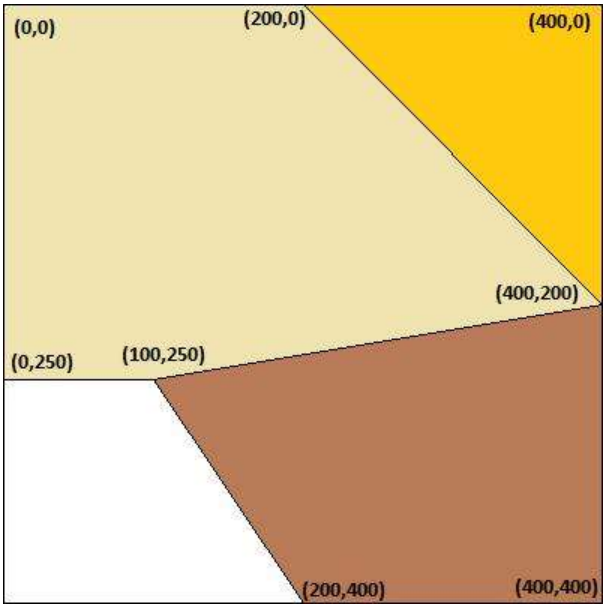


Figure. 3

Finally he found the position of the missing piece as below figure:

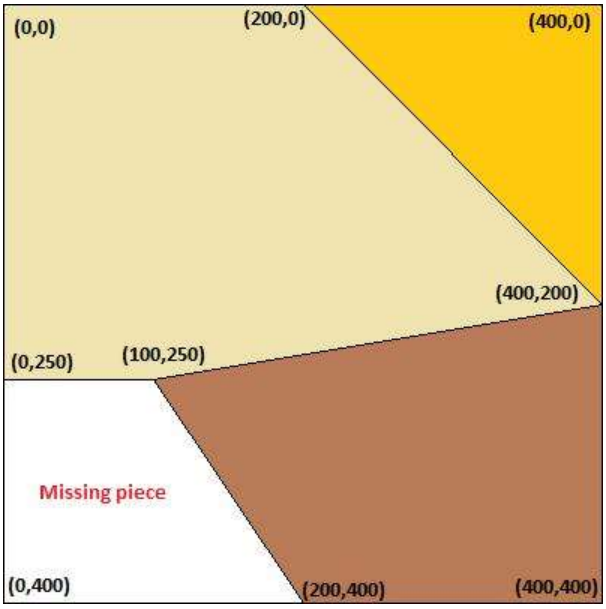


Figure. 4

Lastly, display the coordinates of missing glass piece in the clockwise direction starting from the corner (0,250), as output.

War Companion

Problem Description

Infinity War is Over. Thanos has successfully collected all the Infinity Stones and wiped out half the population of the universe. Now the world depends on the remaining Avengers to bring back their loved ones.

To get a last chance of defeating Thanos, the Avengers has put together a team of its best warriors to try to steal the Infinity Gauntlet and restore order to the universe. The warriors must be put in pairs into its warships and sent out. Obviously, the team size is even.

Each warrior in the warship needs to work well with his partner in the warship, and chemistry between them is important. Hence the Supreme Commander has requested all the warriors to give a list of the remaining warriors in the team in the order of their preferring to work with them.

Using these lists the Supreme Commander needs to create a set of suitable pairs of warriors, with each warrior getting a partner. A set of pairings of warriors is not suitable if two warriors exist who both prefer each other more than their existing partner. The Supreme Commander recognizes that there can be more than one set of suitable pairs of warriors. He ranks the warriors in descending order of competence, so that the most competent are at the top. He has directed you, his chief analyst, to create a suitable set of pairings that lets the most competent warrior to partner someone as high in list of preferences as possible, and then the next most competent warrior to work with as high a person on his list as possible, and so on.

Please write a program to create a suitable set of pairings that meets the Supreme Commander’s directions. If no such pairing exits, indicate that.

Constraints

N <= 10

Input Format

First line contains the number of warriors (N).

Next N lines contain the preference list of N warriors, where the first word in the line is the warrior and the next (N-1) words are the warriors in the preference order.

The N lines give the warriors in order of decreasing competence

Output

A set of suitable pairs as directed by the Supreme Commander. If no suitable sets exist, output “No Suitable Pairs.”.

Test Case

Explanation

Example 1

Input

6

Ironman Thor Blackwidow Hawkeye Hulk Captainamerica

Thor BlackwidowCaptainamerica Hawkeye Ironman Hulk

Hulk BlackwidowCaptainamerica Hawkeye Ironman Thor

Blackwidow Hawkeye Hulk Ironman Captainamerica Thor

Captainamerica Hawkeye Hulk Blackwidow Thor Ironman

Hawkeye Ironman Thor Blackwidow Hulk Captainamerica

Output

Ironman,Hawkeye

Thor,Captainamerica

Hulk,Blackwidow

Explanation

This is a suitable set of pairs. If we take a pair of warriors, say Thor and Blackwidow,though Thor prefers Blackwidow to his current partner (Captainamerica), Blackwidow prefers the current partner(Hulk) to Thor. Similarly all other pairs of warriors can be checked to see that this is a suitable set of pairings.

Example 2

Input

4

Charles Wolverine Jean Deadpool

Wolverine Jean Charles Deadpool

Jean Charles Wolverine Deadpool

Deadpool Charles Wolverine Jean

Output

No Suitable Pairs.

Explanation

It can be seen that there is no suitable set of pairings. If Deadpool is paired with say Charles, and the other two paired with each other, consider the warriors Charles and Jean. Charles prefers Jean to his current partner, Deadpool, and Jean prefers Charles to the current partner, Wolverine. Hence this is not a suitable pairing. Similarly, Deadpool cannot be paired with anyone else to form a suitable set. Thus the output is “No Suitable Pairs”