Greetings From Globussoft

- Given below are 5 Programming questions, you have to solve any 3 out of 5 questions.

- These 5 questions you can attempt in any technology like C/C++, java, .Net, PHP

- To solve these 3 questions you've max. 3 hours.

- While Solving these questions you are not allowed to use any Search Engine like Google, Yahoo, Bing ...

All the best for your test

Globussoft

QUESTION - 1

Problem

Suppose you are given a $2^a x 2^b$ array. It is stored sequentially in memory in the usual way, first values in the first row, then values in the second one and so on. You would like to transpose it, but you don't have any additional memory. The only operation that you can perform is swapping contents of two memory cells. What is the minimal number of such operations required for transpostion?

Input

The first line of input contains the number of test cases c (1<=c<=100). Each test case consists of two integers a,b (0<=a+b<=500000).

Output

For each test case output the minimal number of swaps required to transpose an $2^a x 2^b$ array. As it can be quite large, you have to output its remainder when divided by 1000003 (yes, it's a prime number :).

Example

```
Input:
3
1 1
2 2
5 7

Output:
1
6
3744
```

QUESTION – 2

Problem

Your task will be to calculate number of different assignments of n different topics to n students such that everybody gets exactly one topic he likes.

Input

First line of input contains number of test cases c (1<=c<=80). Each test case begins with number of students n (1<=n<=20). Each of the next n lines contains n integers describing

preferences of one student. 1 at the ith position means that this student likes ith topic, 0 means that he definitely doesn't want to take it.

Output

For each test case output number of different assignments (it will fit in a signed 64-bit integer).

Example

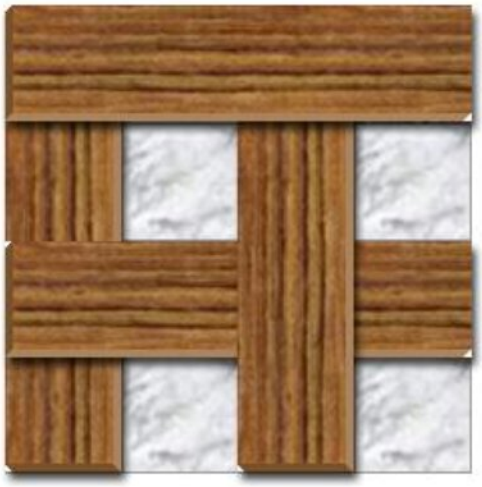
```
Input:
3
3
1 1 1
1 1 1
1 1 1
11
1 0 0 1 0 0 0 0 0 1 1
1 1 1 1 1 0 1 0 1 0 0
1 0 0 1 0 0 1 1 0 1 0
1 0 1 1 1 0 1 1 0 1 1
0 1 1 1 0 1 0 0 1 1 1
1 1 1 0 0 1 0 0 0 0 0
0 0 0 0 1 0 1 0 0 0 1
1 0 1 1 0 0 0 0 0 0 1
0 0 1 0 1 1 0 0 0 1 1
1 1 1 0 0 0 1 0 1 0 1
1 0 0 0 1 1 1 1 0 0 0
11
0 1 1 1 0 1 0 0 0 1 0
0 0 1 1 1 1 1 1 1 1 1
1 1 0 1 0 0 0 0 0 1 0
0 1 0 1 0 1 0 1 0 1 1
1 0 0 1 0 0 0 0 1 0 1
0 0 1 0 1 1 0 0 0 0 1
1 0 1 0 1 1 1 0 1 1 0
1 0 1 1 0 1 1 0 0 1 0
0 0 1 1 0 1 1 1 1 1 1
0 1 0 0 0 0 0 0 0 1 1
0 1 1 0 0 0 0 0 1 0 1

Output:
6
7588
7426
```

QUESTION – 3

To reach the treasure, **Jones** has to pass through the **"Room of Death"**. The floor of this room is a square with side **120** units. It is laid with square tiles of dimensions **{1 X 1}** arranged into a grid. But, at some places in the grid tiles are missing. As soon as the door to this room is opened poisonous gas starts coming out of these missing grid locations. The only escape from this gas is

to completely cover these locations with planks lying outside the room. Each plank has dimensions **{120 X 1}** and can only be placed parallel to either sides of the floor. Now **Jones** wants to minimize the damage to his health so that he has enough of it left for the treasure. He figures out that in order to achieve this he has to use the minimum number of planks possible. He also realises that even if the planks overlap, poisonous gas from the missing tiles can still be successfully blocked. Please help **Jones** in this task.



Input

- The first line of the input is a positive integer t <= 20, denoting the number of rooms.
- The descriptions for the t rooms follow one after the other.
- Room Description:
    - The first line of the room description is a positive integer n (n <= 10010), denoting the number of missing tile locations.
    - This is followed by the n lines, one for each missing tile location.
    - Each line contains two integers x y (0 <= x, y < 120), separated by a single space, representing the co-ordinates of the missing tile location.

Output

The output should consist of **t** lines, one for each room. The $\mathbf{k}^{th}$ line in the output should be an integer $\mathbf{m_k}$, the minimum number of planks needed for the $\mathbf{k}^{th}$ room.

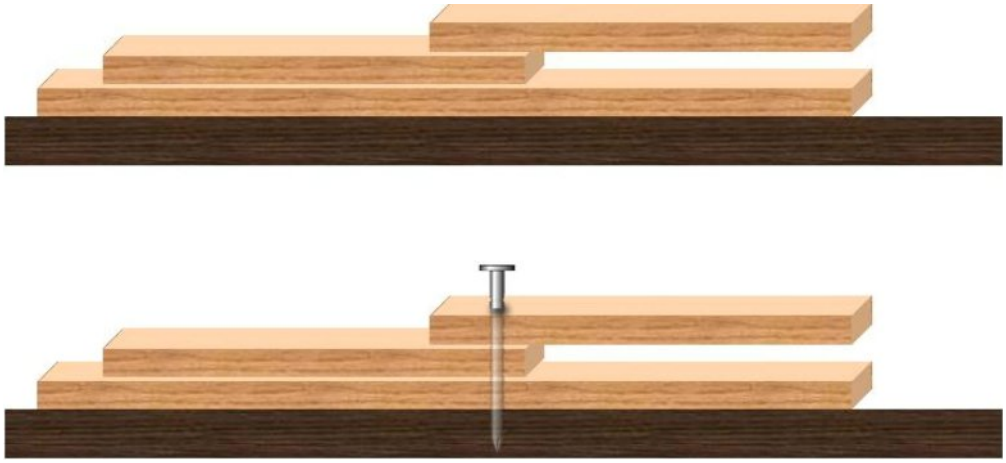
Example

Input:
2
3
1 0
2 0
3 0
4
1 1
2 2
3 3
4 4

Output:
1
4

QUESTION – 4

To get to the treasure, **Jones** must complete one more task. He comes across a table, where there are a number of wooden planks lying along the length of the table. He notices that the width of the table is exactly equal to the width of every plank on it. The planks are so heavy that they cannot be manually moved in any way. Some of these wooden planks are overlapping. **Jones** has a hammer and the Gods grant him infinite nails. The planks have to be joined to the table with nails such that every plank is connected to the table through at least one nail. The nails are of sufficient length, and have to be hammered vertically into the table. One or more planks can be joined to the table through a single nail provided they have a common overlap. Find out the minimum number of nails he needs to nail all planks to the table.



Input

- The first line of the input is a positive integer **t <= 20**, denoting the number of tables.
- The descriptions of the table follow one after the other.
- **Table description:**
    - The first line of the description of the **k^{th}** table contains a positive integer **n (n <= 10010)**, the number of planks on it.
    - This is followed by **n** lines containing the description of the planks.
    - The description of each plank is a pair of integers **a** and **b (0 <= a <= b <= 10000010)**, denoting the distance of the left end and right end of the plank from the left end of the table.

Output

The output must contain **t** lines , the **k^{th}** line corresponding to the **k^{th}** table. The output on the **k^{th}** line must be an integer **i_k**, the minimum number of nails required.

Example

```
Input:
2
3
1 5
3 5
2 4
2
1 4
4 5

Output:
1
1
```

QUESTION – 5

Let **A** and **B** be two strings made up of alphabets such that **$A = A_{[1-n]}$, $B = B_{[1-m]}$**. We say **B** is a subsequence of **A** if there exists a sequence of indices **$i_1 < i_2 < .. < i_m$** of **A** such that **A[ik] = B[k]**.

Given B[1-m], a string of characters from some alphabets, B^i is defined as string with the characters of B each repeating i times. For example, (abbacc)^3 = aaabbbbbbaaacccccc. Also, B^0 is the empty string.

Given strings X, Y made up of characters from 'a' - 'z' find the maximum value of M such that X^M is a subsequence of Y.

Input

- The first line of the input contains a positive integer t <= 20, denoting the no. of test cases.
- The following 2t lines contain the value of X and Y for the cases.
- The description of the test cases follow one after the other.
    - Line 2k contains the value of X for case k; (1 <= k <= t)
    - Line 2k+1 contains the value of Y for case k; (1 <= k <= t).
    - The no. of characters in X , Y will be <= 500010.

Output

The output must contain t lines, each line corresponding to a test case. The value on the kth line should be the value of M for the kth pair of X and Y.

Example

Input:
3
abc
aabbcc
abc
bbccc
abcdef
abc

Output:
2
0
0