Practice Contest

A. Old Magician
B. Square Fields
C. Cycles

Questions asked 4

Submissions

Old Magician
5pt | Not attempted 203/214 users correct (95%)
10pt | Not attempted 193/198 users correct (97%)

Square Fields
10pt | Not attempted 146/157 users correct (93%)
25pt | Not attempted 107/128 users correct (84%)

Cycles
15pt | Not attempted 126/146 users correct (86%)
35pt | Not attempted 20/41 users correct (49%)

Top Scores

gawry	100
bmerry	100
Olexiy	100
ACRush	100
ardiankp	100
gepa	100
natalia	100
Alexus	100
almelv	100
OpenGL	100

Problem A. Old Magician

Small input 5 points	Solve A-small
Large input 10 points	Solve A-large

Problem

A magician does the following magic trick. He puts W white balls and B black balls in his hat and asks someone from the audience, say Bob, to remove pairs of balls in whatever order Bob would desire. After removing a pair of balls, Bob is asked to place a white ball back into the hat if they are the same color. Otherwise he is asked to place a black ball into the hat.

When Bob is left with only one ball in the hat, he asks the magician what color the last ball is. Needless to say, the magician can't see the order by which Bob does the replacements.

The problem is that the magician, like most magicians, is old and sometimes forgets how to do the trick. Being the kind person you are, you are going to help the magician.

For each pair of numbers (W,B) you are asked to output one of the following:

- "WHITE" - if the last ball in the hat will be white for sure.
- "BLACK" - if the last ball in the hat will be black for sure.
- "UNKNOWN" - if you can't be sure of the last ball's color.

Input

The first line of the input file contains the number of cases, **N**. **N** test cases follow.

Each case contains **W** and **B** on a line separated by a space.

Output

For each input case, you should output:

```
Case #X: Y
```

where **X** is the number of the test case and **Y** is either "WHITE", "BLACK" or "UNKNOWN" as explained above. (quotes for clarity)

Limits

$0 < \mathbf{N} \leq 1000$
$\mathbf{W} + \mathbf{B} > 0$

Small dataset

$0 \leq \mathbf{W} \leq 1000$
$0 \leq \mathbf{B} \leq 1000$

Large dataset

$0 \leq \mathbf{W} \leq 10^9$
$0 \leq \mathbf{B} \leq 10^9$

Sample

Input	Output
2 3 1 3 6	Case #1: BLACK Case #2: WHITE

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Problem B. Square Fields

Small input
10 points
Solve B-small

Large input
25 points
Solve B-large

Problem

You are given **n** points in the plane. You are asked to cover these points with **k** squares.

The squares must all be the same size, and their edges must all be parallel to the coordinate axes.

A point is covered by a square if it lies inside the square, or on an edge of the square.

Squares can overlap.

Find the minimum length for the squares' edges such that you can cover the **n** points with **k** squares.

Input

The first line of input gives the number of cases, **N**. **N** test cases follow. The first line of each test contains two positive integers **n** and **k**. Each of the next **n** lines contains a point as two integers separated by exactly one space. No point will occur more than once within a test case.

Output

For each test case, you should output one line containing "Case #**X**: **Y**" (quotes for clarity), where **X** is the number of the test case, starting from 1, and **Y** is the minimum length for the squares' edges for that test case.

Limits

The points' coordinates are non-negative integers smaller than 64000.

$1 \le \mathbf{N} \le 10$

Small dataset

$1 \le \mathbf{k} < \mathbf{n} \le 7$

Large dataset

$1 \le \mathbf{k} < \mathbf{n} \le 15$

Sample

Input	Output
2 5 2 1 1 2 2 3 3 6 6 7 8 3 2 3 3 3 6 6 9	Case #1: 2 Case #2: 3


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Problem C. Cycles

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the Quick-Start Guide to get started.

Small input 15 points	Solve C-small
Large input 35 points	Solve C-large

Problem

You are given a complete undirected graph with **n** nodes numbered from 1 to **n**. You are also given **k** *forbidden* edges in this graph.

You are asked to find the number of Hamiltonian cycles in this graph that don't use any of the given **k** edges. A Hamiltonian cycle is a cycle that visits each vertex exactly once. A cycle that contains the same *edges* is only counted once. For example, cycles 1 2 3 4 1 and 1 4 3 2 1 and 2 3 4 1 2 are all the same, but 1 3 2 4 1 is different.

Input

The first line of input gives the number of cases, **N**. **N** test cases follow. The first line of each test case contains two integers, **n** and **k**. The next **k** lines contain two integers each, representing the vertices of a forbidden edge. There will be no self-edges and no repeated edges.

Output

For each test case, output one line containing "Case #**X**: **Y**", where **X** is the case number (starting from 1) and **Y** is the number of Hamiltonian cycles that do not include any of those **k** edges. Print your answer modulo 9901.

Limits

$1 \le \mathbf{N} \le 10$,
$0 \le \mathbf{k} \le 15$.

Small dataset

$3 \le \mathbf{n} \le 10$

Large dataset

$3 \le \mathbf{n} \le 300$

Sample

Input	Output
2 4 1 1 2 8 4 1 2 2 3 4 5 5 6	Case #1: 1 Case #2: 660

In the first sample input, there is only one cycle: 1 3 2 4 1.