

World Finals 2010

[A. Letter Stamper](#)[B. City Tour](#)[C. Candy Store](#)[D. Travel Plan](#)[E. Ninjutsu](#)**F. The Paths of Yin Yang**[Contest Analysis](#)[Questions asked](#)

Submissions

Letter Stamper

8pt Not attempted
20/22 users correct (91%)19pt Not attempted
5/10 users correct (50%)

City Tour

4pt Not attempted
21/21 users correct (100%)23pt Not attempted
19/21 users correct (90%)

Candy Store

7pt Not attempted
21/21 users correct (100%)20pt Not attempted
12/13 users correct (92%)

Travel Plan

3pt Not attempted
22/23 users correct (96%)30pt Not attempted
17/18 users correct (94%)

Ninjutsu

11pt Not attempted
6/8 users correct (75%)23pt Not attempted
0/2 users correct (0%)

The Paths of Yin Yang

17pt Not attempted
1/2 users correct (50%)

35pt Not attempted

Top Scores

Egor	125
krijgertje	114
Burunduk1	112
ACRush	106
marek.cygan	95
meret	95
rng..58	95
pashka	95
iwi	95
eatmore	94

Problem F. The Paths of Yin Yang

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
17 points

Solve F-small

Large input
35 points

Solve F-large

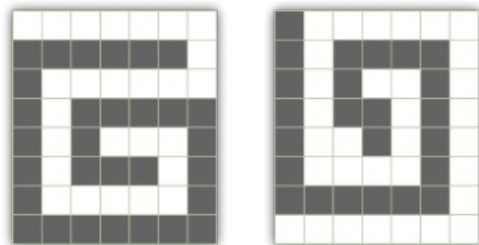
*So, If and Else grow out of each other;
Hardness and Tractability complete each other;
Long int and Short int shape each other;
High bits and Low bits determine each other;
Music and Voice give harmony to each other;
Push front and Push back give sequence to each other.*
-- Tao Te Ching, Laozi, Zhou dynasty, ancient China.
Translated (loosely) by yours truly.

Problem

Given an rectangular grid of **N** rows and **M** columns, each cell can be labeled black (Yin) or white (Yang). Two cells are *neighbors* if they share a common unit-length edge segment. The grid is *valid* if all the black cells form a path, and all the white cells form a path. A *path* is a set *S* of cells defined as follows:

- The cells form a connected piece. From each cell in *S*, you can reach any other cell in *S* by moving between neighbors within *S*.
- Exactly two cells in *S* have exactly one neighbor in *S* each. These are the "ends" of the path.
- Every other cell in *S* has exactly two neighbors in *S*.

For example, in the picture below, the first grid is valid, while the second grid is not -- although the black cells form a path, the white cells do not.



Given **N** and **M**, compute the number of valid grids. Note that symmetry doesn't matter -- as long as two valid grids differ in one position they are considered different, even if one can be rotated or flipped to the other.

Input

The first line of the input will be a single integer **T**, the number of test cases. **T** lines follow, each of which contains two integers separated by a space: "**N M**", as defined above.

Output

For each test case, output a line in the form "Case #**x**: **A**", where **x** is the case number, starting from 1, and **A** is the number of valid grids of the specified size.

Limits

 $1 \leq T \leq 50$

Small dataset

 $4 \leq N, M \leq 10$

Large dataset

For 80% of the test cases, $4 \leq N, M \leq 50$
 For 90% of the test cases, $4 \leq N, M \leq 70$
 For all test cases, $4 \leq N, M \leq 100$

Sample

Input	Output
3	Case #1: 24
4 4	Case #2: 44
4 6	Case #3: 48
5 5	

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