

Problem C. Bathroom StallsConfused? Read the [quick-start guide](#).Small input 1
5 points

Solve C-small-1

You may try multiple times, with penalties for wrong submissions.

Small input 2
10 pointsYou must solve small input 1 first.
You may try multiple times, with penalties for wrong submissions.Large input
15 pointsYou must solve all small inputs first.
You have 8 minutes to solve 1 input file. (Judged after contest.)**Problem**

A certain bathroom has $N + 2$ stalls in a single row; the stalls on the left and right ends are permanently occupied by the bathroom guards. The other N stalls are for users.

Whenever someone enters the bathroom, they try to choose a stall that is as far from other people as possible. To avoid confusion, they follow deterministic rules: For each empty stall S , they compute two values L_S and R_S , each of which is the number of empty stalls between S and the closest occupied stall to the left or right, respectively. Then they consider the set of stalls with the farthest closest neighbor, that is, those S for which $\min(L_S, R_S)$ is maximal. If there is only one such stall, they choose it; otherwise, they choose the one among those where $\max(L_S, R_S)$ is maximal. If there are still multiple tied stalls, they choose the leftmost stall among those.

K people are about to enter the bathroom; each one will choose their stall before the next arrives. Nobody will ever leave.

When the last person chooses their stall S , what will the values of $\max(L_S, R_S)$ and $\min(L_S, R_S)$ be?

Solving this problem

This problem has 2 Small datasets and 1 Large dataset. You must solve the first Small dataset before you can attempt the second Small dataset. You will be able to retry either of the Small datasets (with a time penalty). You will be able to make a single attempt at the Large, as usual, only after solving both Small datasets.

Input

The first line of the input gives the number of test cases, T . T lines follow. Each line describes a test case with two integers N and K , as described above.

Output

For each test case, output one line containing Case # x : y z , where x is the test case number (starting from 1), y is $\max(L_S, R_S)$, and z is $\min(L_S, R_S)$ as calculated by the last person to enter the bathroom for their chosen stall S .

Limits

$1 \leq T \leq 100$.
 $1 \leq K \leq N$.

Small dataset 1

$1 \leq N \leq 1000$.

Small dataset 2

$1 \leq N \leq 10^6$.

Large dataset

$1 \leq N \leq 10^{18}$.

Sample

Input	Output
5	Case #1: 1 0
4 2	Case #2: 1 0

Submissions	
Oversized Pancake Flipper	
5pt	Correct 18314/22126 users correct (83%)
10pt	Submitted 17673 users attempted
Tidy Numbers	
5pt	Correct 22639/24374 users correct (93%)
15pt	Submitted 20358 users attempted
Bathroom Stalls	
5pt	Not attempted 12111/13855 users correct (87%)
10pt	Not attempted 9491/11433 users correct (83%)
15pt	Not attempted 7670 users attempted
Fashion Show	
10pt	Not attempted 842/2043 users correct (41%)
25pt	Not attempted 709 users attempted

Top Scores	
FatalEagle	100
ACMonster	100
y0105w49	100
johngs	100
HellKitsune123	100
kyc	100
SergeyRogulenko	100
spnautilus	100
BudAlNik	100
mjy0724	100

5 2	Case #3: 1 1
6 2	Case #4: 0 0
1000 1000	Case #5: 500 499
1000 1	

In Case #1, the first person occupies the leftmost of the middle two stalls, leaving the following configuration (0 stands for an occupied stall and . for an empty one): 0.0..0. Then, the second and last person occupies the stall immediately to the right, leaving 1 empty stall on one side and none on the other.

In Case #2, the first person occupies the middle stall, getting to 0..0..0. Then, the second and last person occupies the leftmost stall.

In Case #3, the first person occupies the leftmost of the two middle stalls, leaving 0..0..0. The second person then occupies the middle of the three consecutive empty stalls.

In Case #4, every stall is occupied at the end, no matter what the stall choices are.

In Case #5, the first and only person chooses the leftmost middle stall.

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