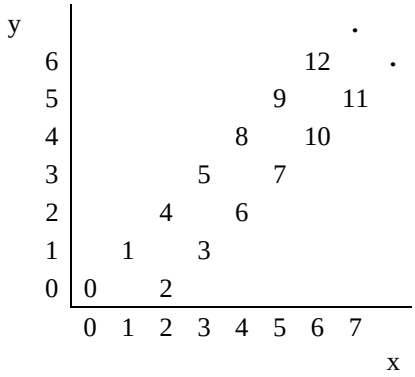
Problem A: Number Steps

Starting from point (0,0) on a plane, we have written all non-negative integers 0,1,2, … as shown in the figure. For example, 1, 2, and 3 has been written at points (1,1), (2,0), and (3, 1) respectively and this pattern has continued.



You are to write a program that reads the coordinates of a point (x, y), and writes the number (if any) that has been written at that point. (x, y) coordinates in the input are in the range 0…5000.

Input (Standard input)

The first line of the input file contains a single integer t ($1 \le t \le 100$), the number of test cases. In each of the t following lines, there is x, and y representing the coordinates (x, y) of a point. x and y are integers.

Output (Standard output)

For each point in the input, write the number written at that point or write '**`No Number`**' if there is none.

Sample Input and Output

Standard Input	Standard Output
3 4 2 3 4 6 6	6 No Number 12

Problem B: Parencodings

Let $S = s_1\ s_2\ \dots\ s_{2n}$ be a well-formed string of parentheses. S can be encoded in two different ways:

- By an integer sequence $P = p_1\ p_2\ \dots\ p_n$ where p_i is the number of left parentheses before the ith right parenthesis in S (P-sequence).
- By an integer sequence $W = w_1\ w_2\ \dots\ w_n$ where for each right parenthesis, say a in S, we associate an integer which is the number of right parentheses counting from the matched left parenthesis of a up to a. (W-sequence).

Following is an example of the above encodings:

S	(((()())))
P-sequence	4 5 6666
W-sequence	1 1 1456

Write a program to convert *P*-sequence of a well-formed string to the *W*-sequence of the same string.

Input (Standard input)

The first line of the input file contains a single integer t ($1 \le t \le 100$), the number of test cases, followed by the input data for each test case. The first line of each test case is an integer n ($1 \le n \le 20$), and the second line is the *P*-sequence of a well-formed string. It contains n positive integers, separated with blanks, representing the *P*-sequence.

Output (Standard output)

The output file consists of exactly t lines corresponding to test cases. For each test case, the output line should contain n integers describing the *W*-sequence of the string corresponding to its given *P*-sequence.

Sample Input and Output

Standard Input	Standard Output
3 3 1 2 3 6 4 5 6 6 6 6 9 4 6 6 6 6 8 9 9 9	1 1 1 1 1 1 4 5 6 1 1 2 4 5 1 1 3 9

Problem C: Pockets

Mr. Mohandes has *n* pockets in his blue jeans. He has c_i Oshloghs in his *i*-th pocket. He plans to buy a tablet with the price of *w* Oshloghs. Mr. Mohandes asks you to find the minimum number of pockets whose total money is at least *w* Oshloghs.

Input (Standard input)

The first line of the input includes the number of test cases, $1 \leq t \leq 100$. Each test case contains two lines. The first line contains two integers, $1 \leq n \leq 1000$ and $1 \leq w \leq 10^9$. The following line contains n integers, $1 \leq a_1, a_2, \ldots, a_n \leq 1000$, separated by a single space.

Output (Standard output)

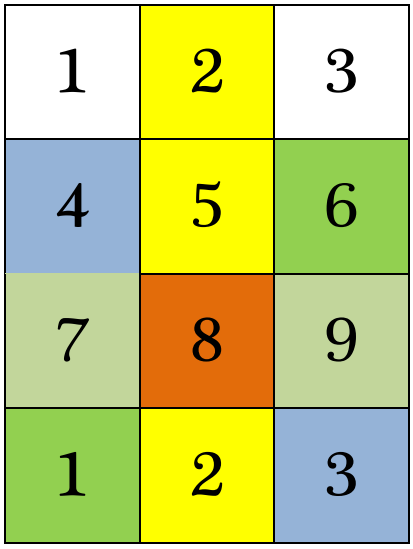
For each test case, print one line containing the minimum number of pocket whose total money is at least *w* Oshloghs. In the case of impossibility, print "No solution!" instead.

Sample Input and Output

Standard Input	Standard Output
3 2 10 1 9 3 20 4 5 6 4 7 2 3 1 4	2 No solution! 2

Problem D: The Most Valuable Queen

Each square of an $n \times m$ chessboard is associated with a value which is a positive integer number. For a queen on the chessboard, its value is defined to be the sum of the values of all squares threatened by the queen including the square in which queen stands. Your job is to find the most valuable queen (a queen whose value is maximum).



Input (Standard input)

The first line of the input includes the number of test cases, $1 \leq t \leq 100$. First line of each test case contains two integers, $1 \leq n \leq 1000$, the number of the chessboard rows and $1 \leq m \leq 1000$, the number of the chessboard columns. Each of the following n lines contains m integers separated with spaces. The *j*-th number in the *i*-the line is the value of the square placed in *i*-th row and *j*-th column of the chessboard. All value are positive and not greater than 1000.

Output (Standard output)

For each test case, print the value of the most valuable queen in one line.

Sample Input and Output

Standard Input	Standard Output
2 4 3 1 2 3 4 5 6 7 8 9 1 2 3 4 4 1 2 1 2 2 1 2 1 1 2 1 2 2 1 2 1	47 20

Problem E: GCD

Suppose that $f(i,j,k)$ is defined to be the greatest common divisor of $i,\ i+j,\ i+2j, \ldots,\ i+(k-1)j,\ i+kj$. Write a program that gets n, m and p as the input and computes the following as the output.

$$\sum_{i=1}^{n}\sum_{j=1}^{m}\sum_{k=1}^{p} f(i,j,k)$$

Input (Standard input)

The first line of the input includes the number of test cases, $1 \le t \le 20$. Each of the following t lines contains three positive integers n, m and p separated by a single space. All input numbers are not greater than 1000.

Output (Standard output)

For each test case, print the output of your program in one line.

Sample Input and Outpu

Standard Input	Standard Output
2 2 3 4 4 5 6	28 168

Problem F: Summation

In each cell of $n \times m$ table an integer number is written which shows the number of cells located left or below that cell.

2	3	4	5
1	2	3	4
0	1	2	3

You are to write a program that reads size of a table (n and m) and calculate the sum of all cells in the table.

Input (Standard input)

The first line of the input includes the number of test cases, $1 \leq t \leq 100$. First line of each test case contains two integers, $1 \leq n \leq 100$, the number of the rows and $1 \leq m \leq 100$, the number of the columns.

Output (Standard output)

For each test case, output a line containing the sum of all the numbers of table.

Sample Input and Output

Standard Input	Standard Output
3 2 2 2 3 3 4	4 9 30

Problem G: T-island Intervals

There are n intervals in the T-island. Two intervals are called "adjacent", if their common segment is strictly greater than k. We want to put some cannibals on the intervals, so that none of them eat each other. A cannibal can move from one interval to any of its adjacent intervals. Find the maximum number of cannibals we can put on the intervals of T-island.

Input (Standard input)

The first line of the input file contains a single integer t ($1 \le t \le 100$), the number of test cases. First line of each test case contains two integers $1 \le n \le 10^5$ and $1 \le k \le 10^9$, followed by n lines each containing two integers l_i and r_i ($-10^9 \le l_i \le r_i \le 10^9$), the left and right endpoints of the i-th interval.

Output (Standard output)

For each test case, output the maximum number of cannibals that can be put on the T-island.

Sample Input and Output

Standard Input	Standard Output
2 3 1 1 3 2 6 4 8 3 2 1 10 2 8 4 6	2 2

Problem H: Largest Disk

In a $l \times w$ rectangle, there are k points with integer coordinates. Your job is to find the largest disk such that it can be enter to the rectangle from the east side (the side with length l) and then it can be moved toward the west side (in order to exit the rectangle from the west side) while avoiding given points inside the rectangle on its path.

Input (Standard input)

The first line of the input includes the number of test cases, $1 \leq t \leq 100$. Each test case starts with a line containing three integers, $1 \leq l \leq 10^9$, $1 \leq w \leq 10^9$, and $1 \leq k \leq 5000$, the number of points. Each of the following k lines contains two integers $0 < x < w$ and $0 < y < l$, the coordinates of points.

Output (Standard output)

For each test case, print one line containing the radius of largest disk with exactly 2 digits after decimal point.

Sample Input and Output

Standard Input	Standard Output
3 5 10 0 5 10 2 1 4 4 4 5 10 2 1 7 4 8	2.50 1.50 1.58