acm International Collegiate Programming Contest 2002

IBM event sponsor

ACM International Collegiate Programming Contest 2002

South America

8th November 2002

WARM UP SESSION

(This problem set contains 3 problems; pages are numbered from 1 to 5)

Hosted by

University of Buenos Aires, Buenos Aires, Argentina
University of São Paulo, São Paulo, Brazil
Federal University of Pernambuco, Recife, Brazil
Federal University of Rio Grande do Sul, Porto Alegre, Brazil
University of Atacama, Copiapó, Chile
University Nueva Esparta, Caracas, Venezuela
University Lisandro Alvarado, Barquisimeto, Venezuela

Problem A

Fake tickets

Input: fake.in

Your school organized a big party to celebrate your team brilliant win in the prestigious, world-famous ICPC (International Collegiate Poetry Contest). Everyone in your school was invited for an evening which included cocktail, dinner and a session where your team work was read to the audience. The evening was a success – many more people than you expected showed interested in your poetry – although some critics of yours said it was food rather than words that attracted such an audience.

Whatever the reason, the next day you found out why the school hall had seemed so full: the school director confided he had discovered that several of the tickets used by the guests were fake. The real tickets were numbered sequentially from 1 to N ($N \leq 10000$). The director suspects some people had used the school scanner and printer from the Computer Room to produce copies of the real tickets. The director gave you a pack with all tickets collected from the guests at the party's entrance, and asked you to determine how many tickets in the pack had 'clones', that is, another ticket with the same sequence number.

Input

The input contains data for several test cases. Each test case has two lines. The first line contains two integers N and M which indicate respectively the number of original tickets and the number of persons attending the party ($1 \leq N \leq 10000$ and $1 \leq M \leq 20000$). The second line of a test case contains M integers T_i representing the ticket numbers in the pack the director gave you ($1 \leq T_i \leq N$). The end of input is indicated by $N = M = 0$.

Output

For each test case your program should print one line, containing the number of tickets in the pack that had another ticket with the same sequence number.

Sample input	Output for the sample input
5 5 3 3 1 2 4 6 10 6 1 3 6 6 4 2 3 1 2 0 0	1 4

Problem B

Square Lottery

Input file: square.in

The government of the United Republic of Little Tower is developing a new kind of lottery. The main purpose of the lottery is to raise money to build Little Tower's Olympic Stadium, for an attendance of 400,000 people. The stadium is strategic for Little Tower's proposal to host the World Cup Finals in 2078.

The lottery will run weekly. Each week, tickets in the form of square cards will be sold. Each ticket will have squares with printed numbers within, in a sequence of *N* rows and *N* columns, as shown in Figure 1.

1	7	4
6	3	8
2	9	5

Fig. 1: A sample lottery ticket, for $N = 3$.

In each ticket no number appears twice, and therefore all numbers from 1 to N^2 are present (in random positions). No two tickets sold in the same week will be equal. Nevertheless, all possible different tickets will be sold, since Little Tower's citizens love lotteries. Tickets will be sold for T$1.00 (one Torreal, Little Tower's monetary unit).

To choose the winner(s), four numbers (between 1 and N^2) will be picked randomly, and the ticket(s) whose chosen numbers positions are corners of a square will be awarded the prize money. For example, the ticket shown in Figure 1 is a winning ticket if the numbers picked are (6, 3, 2, 9), (1, 4, 2, 5) or (7, 8, 9, 6), but it is not a winning ticket if the numbers picked are (1, 7, 2, 9). If more than one ticket is a winner, customers who bought those tickets will share the week's lottery prize.

The government of Little Tower asks your help to determine the prize value to be payed for each winning ticket, for a given *N*, and a given percentage, over the total amount received for the tickets, that the government wants to pay as prizes.

Input

Input will contain several test cases. Each test case is described in a line containing two integers *N* and *P*, representing respectively the number of rows (and columns) of tickets, and the percentage of the money received that will be payed as prize ($2 \le N \le 100$ and $0 \le P \le 100$). The end of input is indicated by $N = P = 0$.

Output

For each test case in the input your program should produce one line of output, containing a real value representing the prize to be payed to each winning ticket. The prize value must be printed with two-digit precision, and the last decimal digit must be rounded. The input will not contain test cases where differences in rounding are significant.

Sample input	Output for the sample input
2 100 2 80 3 50 0 0	1.00 0.80 10.50

Problem C

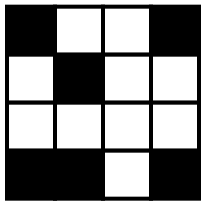
Uncle Tom's Inherited Land

Input file: uncle.in

Your old uncle Tom inherited a piece of land from his great-great-uncle. Originally, the property had been in the shape of a rectangle. A long time ago, however, his great-great-uncle decided to divide the land into a grid of small squares. He turned some of the squares into ponds, for he loved to hunt ducks and wanted to attract them to his property. (You cannot be sure, for you have not been to the place, but he may have made so many ponds that the land may now consist of several disconnected islands.)

Your uncle Tom wants to sell the inherited land, but local rules now regulate property sales. Your uncle has been informed that, at his great-great-uncle's request, a law has been passed which establishes that property can only be sold in rectangular lots the size of two squares of your uncle's property. Furthermore, ponds are not salable property.

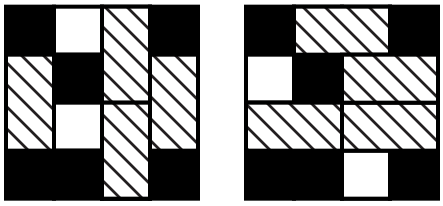
Your uncle asked your help to determine the largest number of properties he could sell (the remaining squares will become recreational parks).



(a) 4 x 4 land with 6 ponds

(b) pond

(c) allowed size for new properties



(d) Two possible solutions

Input

Input will include several test cases. The first line of a test case contains two integers N and M, representing, respectively, the number of rows and columns of the land ($1 \le N, M \le 100$). The second line will contain an integer K indicating the number of squares that have been turned into ponds ($(N \times M) - K \le 50$). Each of the next K lines contains two integers X and Y describing the position of a square which was turned into a pond ($1 \le X \le N$ and $1 \le Y \le M$). The end of input is indicated by $N = M = 0$.

Output

For each test case in the input your program should produce one line of output, containing an integer value representing the maximum number of properties which can be sold.

Sample input	Output for the sample input
4 4 6 1 1 1 4 2 2 4 1 4 2 4 4 4 3 4 4 2 3 2 2 2 3 1 0 0	4 3