A simple game, called KillHer-I, is investigated in Shiraz University game design group. This game involves two players, each with one piece, and is played on a board of n squares arranged in a line with a fair dice of m numbers (1, 2, 3, ..., m). Initially, the two pieces are in squares on either ends of the board. The players take turns to move their pieces forward by the number of squares indicated by the dice roll. The player who completes their move in the square already occupied by the opponent's piece, captures it and wins the game. Otherwise, if a player overpasses their opponent's piece in their move, they lose. The game continues until one of the players wins (or the other one loses).

This game's primary vice is that the whole game is completely decided by chance. Therefore, another version of this game is designed, called KillHer-II. In this variant, each player may choose to move their piece from 1 to throw-of-the-dice squares.

The designers want to know, the probability of the starting player winning the games KillHer-I and KillHer-II independently, given the board size n and dice sides m.

Input

The first line of input contains an integer $T \leq 200$ as the number of test-cases. Each of the following T lines feature two integers n and m both less than 100,000.

Output

For each test-case, you should print on a new line, the probability of the starting player winning first in KillHer-I and then in KillHer-II, separated by one space. Each probability should be expressed in exactly 4 decimal places.

Sample Input

```
5
1 1
1 4
2 2
10 1
18467 41
9514 22813
```

Sample Output

```
1.0000 1.0000
0.2500 1.0000
0.7500 0.5000
0.0000 0.0000
0.5000 0.5000
0.3410 0.7057
```