

# 10207 The Unreal Tournament

In this particular problem, *The Unreal Tournament* is a tournament, which consists of only two teams. Let these two teams be *Abahoni* and *Mohamedan*. They play in between them not more than  $2n - 1$  games, the winner being the first team to achieve  $n$  victories. You can assume that there are no tied games, the result of each game is independent and for any match there is a constant probability  $p$  that team *Abahoni* will win and hence there is a constant probability  $q = 1 - p$  that team *Mohamedan* will win.

$P(i, j)$  is the probability that team *Abahoni* will win the series given that they still need  $i$  more victories to achieve this, whereas team *Mohamedan* still need  $j$  more victories if they are to win. The  $P(i, j)$  can be computed with a function like the following

```
Function P(i,j)
    if i = 0 then return 1
    else if j = 0 then return 0
    else return pP(i-1,j) + qP(i,j-1)
```

You will have to write a program that gives the probability of winning for any  $p, i$  and  $j$  and also gives the number of recursive calls required if the function above is used to get the probability  $P(i, j)$ .

### Input

The input file contains several sets of input. The first line of a set contains one floating-point number  $p(0 < p < 1)$ , and an integer  $N(0 \leq N < 1001)$  where  $p$  is the winning probability of *Abahoni* and  $N$  is the number queries to follow. Each of the next  $N$  lines contains two integers  $i(0 \leq i \leq 1000)$  and  $j(0 \leq j \leq 1000)$ . Input is terminated by a set, which has zero as the value of  $N$ . This set should not be processed.

### Output

For each query you should print two lines. The first line contains the value of  $P(i, j)$  with five digits after the decimal and the second line contains a round number which is the number of recursive calls needed if the function mentioned above was used to determine the value of  $P(i, j)$ . If the value of  $P(i, j)$  is undefined you should print '-1' as its value with similar formatting. A blank line should be printed between the outputs of two consecutive sets.

### Sample Input

```
0.5 3
1 1
2 2
3 3
0.5 2
10 3
10 2
0.7 0
```

### Sample Output

0.50000

2

0.50000

10

0.50000

38

0.01929

570

0.00586

130