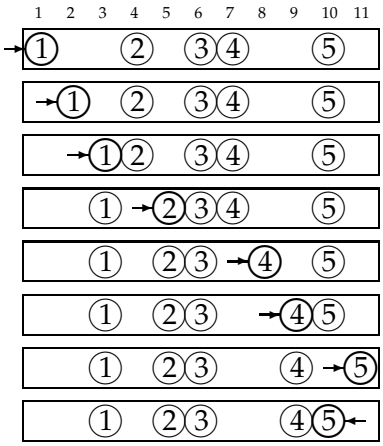
Elastic collisions **P21399_en**

Tercer Concurs de Programació de la FME (2006-05-04)



You have a billiard pool L units long and 1 unit wide, and n identical billiard balls of diameter 1, labeled from left to right with the numbers 1, 2, ..., n. Initially, all balls are at integer positions, and the ball 1 is at the very left (at the position 1). After striking the ball 1, it moves to the right, with a speed of 1 unit per second. Supposing that the collisions (between the balls as well as against right and left walls) are completely elastic, and that there is no friction, at which position will a given ball be at a given second?

Input

Input consists of several cases. Each case begins with L and n, followed by the n positions of the balls. All the positions are different, between 1 and L, and one of them is 1. Then comes $q \geq 1$, the number of queries about this case, followed by q pairs of integer numbers i and t. Assume $1 \leq n \leq 10^4$, $n < L \leq 10^6$, $1 \leq i \leq n$, and $0 \leq t \leq 10^8$.

Output

For each pair of i and t, print the position of the ball with label i at the second t, following the format of the example. Print an empty line after the output for each case.

Sample input

```
11 5
6 4 10 1 7
6
1 0
1 1
1 3
5 3
5 6
3 7

2 1
1
4
1 1
1 0
1 10001
1 10000
```

Sample output

```
At second 0, ball 1 is at 1.
At second 1, ball 1 is at 2.
At second 3, ball 1 is at 3.
At second 3, ball 5 is at 10.
At second 6, ball 5 is at 11.
At second 7, ball 3 is at 6.

At second 1, ball 1 is at 2.
At second 0, ball 1 is at 1.
At second 10001, ball 1 is at 2.
At second 10000, ball 1 is at 1.
```

Problem information

Author : Salvador Roura
Translator : Carlos Molina
Generation : 2024-04-30 16:55:34