

Ex - Rating Estimator

Editorial (/contests/abc292/tasks/abc292_h/editorial)



Time Limit: 3 sec / Memory Limit: 1024 MB

Score : 600 points

Problem Statement

You will participate in N contests, numbered 1 to N in chronological order.

A participant in each contest will be given a value called **performance** for that contest. Let P_i be the performance for contest i .

Additionally, you have a value called **rating**, which changes according to the performances in contests. The initial rating is 0, and the rating after contest n is $\frac{1}{n} (\sum_{i=1}^n P_i)$.

However, once your rating is B or higher, later contests will not affect your rating.

Before the contests, you have decided to estimate your performance in each contest. Let a_i be the initial estimate of your performance in contest i . Process Q queries in the order they are given.

In each query, you are given two integers c and x . First, change the estimate of your performance in contest c to x . (This change is persistent.) Then, assuming that you get the estimated performances in all N contests, print your final rating after the contests.

Constraints

- $1 \leq N \leq 5 \times 10^5$
- $1 \leq B \leq 10^9$
- $1 \leq Q \leq 10^5$
- $0 \leq a_i \leq 10^9$
- $1 \leq c \leq N$
- $0 \leq x \leq 10^9$
- All values in the input are integers.

Input

The input is given from Standard Input in the following format, where c_i and x_i are the c and x for the i -th query:

```
 $N$   $B$   $Q$ 
 $a_1$   $a_2$   $\dots$   $a_N$ 
 $c_1$   $x_1$ 
 $c_2$   $x_2$ 
 $\vdots$ 
 $c_Q$   $x_Q$ 
```

Output

Print Q lines. The i -th line should contain the answer to the i -th query.

Your output is considered correct if the absolute or relative error from the true answer is at most 10^{-9} .

Sample Input 1

[Copy](#)

```
5 6 7
5 1 9 3 8
4 9
2 10
1 0
3 0
3 30
5 100
1 100
```

[Copy](#)

Contest Duration: 2023-03-04(Sat) 21:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20230304T2100&p1=248>) - 2023-03-04(Sat) 22:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20230304T2240&p1=248>) (local time) (100 minutes)

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Sample Output 1

[Copy](#)[Clarifications \(/contests/abc292/clarifications\)](#)

```
6.0000000000000000
```

```
7.5000000000000000
```

```
6.3333333333333333
```

```
17.4000000000000000
```

```
13.333333333333334
```

```
13.333333333333334
```

```
100.0000000000000000
```

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Initially, $(a_1, a_2, a_3, a_4, a_5) = (5, 1, 9, 3, 8)$.

The first query changes a_4 to 9, making $(a_1, a_2, a_3, a_4, a_5) = (5, 1, 9, 9, 8)$.

Here, assuming that your performance in contest i is a_i , your rating will change as follows.

- Initially, your rating is 0.
- After contest 1, your rating will be $5/1 = 5$.
- After contest 2, your rating will be $(5 + 1)/2 = 3$.
- After contest 3, your rating will be $(5 + 1 + 9)/3 = 5$.
- After contest 4, your rating will be $(5 + 1 + 9 + 9)/4 = 6$.
- Your rating will no longer change, because your rating after contest 4 is not less than B .

Thus, your final rating after the contests is 6, which should be printed in the first line.

Language

C++ (GCC 9.2.1)

Source Code

1

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* at most 512 KiB

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