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 $\frac{1}{n}\left(\sum_{i=1}^{n} P_i\right)$.

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

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

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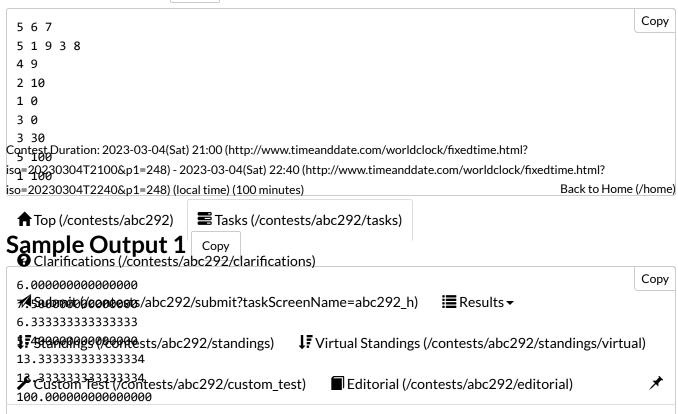
The input is given from Standard Input in the following format, where c_i and x_i are the c and x for the i-th query:

$$
\begin{array}{ccc}
N & B & Q \\
a_1 & a_2 & \ldots \quad a_N \\
c_1 & x_1 \\
c_2 & x_2 \\
\vdots \\
c_Q & x_Q
\end{array}
$$

Output

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

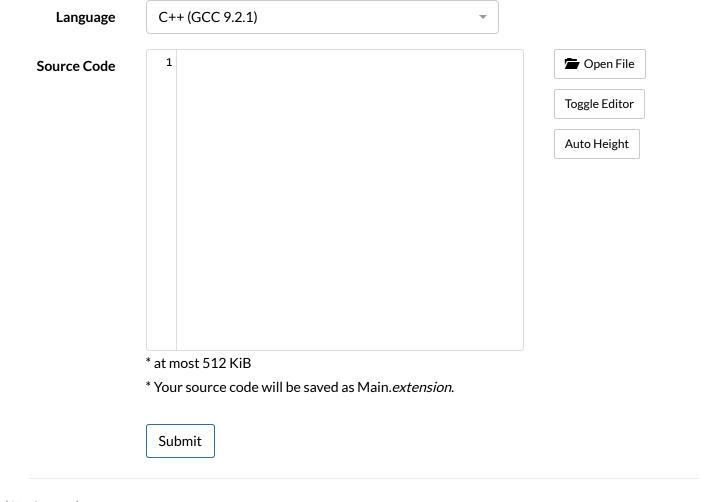Your output is considered correct if the absolute or relative error from the true answer is at most 10^{-9}.

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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
```

Sample Output 1 [Copy]

```
6.000000000000000
7.500000000000000
6.333333333333333
9.400000000000000
13.333333333333334
13.333333333333334
100.000000000000000
```

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
```

* at most 512 KiB

* Your source code will be saved as Main.*extension*.

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