E. Memory and Casinos

time limit per test: 4 seconds
memory limit per test: 512 megabytes
input: standard input
output: standard output

There are n casinos lined in a row. If Memory plays at casino i, he has probability p_i to win and move to the casino on the right ($i + 1$) or exit the row (if $i = n$), and a probability $1 - p_i$ to lose and move to the casino on the left ($i - 1$) or also exit the row (if $i = 1$).

We say that Memory *dominates* on the interval $i \ldots j$ if he completes a walk such that,

- He starts on casino i.
- He never looses in casino i.
- He finishes his walk by winning in casino j.

Note that Memory can still walk left of the 1-st casino and right of the casino n and that always finishes the process.

Now Memory has some requests, in one of the following forms:

- $1\ i\ a\ b$: Set .
- $2\ l\ r$: Print the probability that Memory will *dominate* on the interval $l \ldots r$, i.e. compute the probability that Memory will first leave the segment $l \ldots r$ after winning at casino r, if she starts in casino l.

It is guaranteed that at any moment of time p is a **non-decreasing sequence**, i.e. $p_i \le p_{i+1}$ for all i from 1 to $n - 1$.

Please help Memory by answering all his requests!

Input

The first line of the input contains two integers n and $q (1 \le n, q \le 100\,000)$, — number of casinos and number of requests respectively.

The next n lines each contain integers a_i and b_i $(1 \le a_i < b_i \le 10^9)$ — is the probability p_i of winning in casino i.

The next q lines each contain queries of one of the types specified above ($1 \le a < b \le 10^9$, $1 \le i \le n$, $1 \le l \le r \le n$).

It's guaranteed that there will be at least one query of type 2, i.e. the output will be non-empty.
Additionally, it is guaranteed that p forms a non-decreasing sequence at all times.

Output

Print a real number for every request of type 2 — the probability that boy will "dominate" on that interval. Your answer will be considered correct if its absolute error does not exceed 10^{-4}.

Namely: let's assume that one of your answers is a, and the corresponding answer of the jury is b. The checker program will consider your answer correct if $|a - b| \le 10^{-4}$.

Example

input
3 13 1 3 1 2 2 3 2 1 1 2 1 2 2 1 3 2 2 2 2 2 3 2 3 3

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1 2 2 3
2 1 1
2 1 2
2 1 3
2 2 2
2 2 3
2 3 3
```

output

```
0.3333333333
0.2000000000
0.1666666667
0.5000000000
0.4000000000
0.6666666667
0.3333333333
0.2500000000
0.2222222222
0.6666666667
0.5714285714
0.6666666667
```