LINES

1s

Thanh has divided the Oxy plane into $n + 1$ different vertical media with refractive indices a_0, a_1, a_2, ..., a_n (not necessarily unique). The first medium is normal air ($a_0 = 1$).

The media are separated by n vertical boundaries h_1 to h_n ($-\infty = h_0 < h_1 < h_2 < ... < h_n < h_{n+1} = \infty$). Thus, the i-th medium is the part between two lines $x = h_i$ and $x = h_{i+1}$.

Thanh now casts q laser beams from q points (x_i, y_i), which lie in the first medium, aiming at (z_i, t_i) ($1 \leq i \leq q$). Now Thanh needs to find the total length each ray has travelled from the starting point until it reaches the n-th medium for the first time. It is guaranteed that the ray will eventually reach the n-th medium.

Every laser beam follows the Snell's law of refraction. In short,

$n_1 \sin\theta_1 = n_2 \sin\theta_2$,

where θ_i is the angle between the ray and the normal (the x-axis), and n_1, n_2 are the refractive indices of the two media.

INPUT

The first line contains two positive integers n and q ($1 \leq n, q \leq 10^5$).

For the next n lines, line i contains two integers h_i and a_i ($0 \leq h_i \leq 10^9$, $1 \leq a_i \leq 10^9$).

For the last q lines, line i contains four integers x_i, y_i, z_i, t_i ($0 \leq x_i < z_i$, $x_i < h_1$, $-1000 \leq x_i, y_i, z_i, t_i \leq 1000$).

OUTPUT

For each query, output one number per line. The answer is considered correct if the absolute error or the relative error does not exceed 10^{-4}.

Sample Input	Sample Output
3 1	8.936454547
3 6	
6 3	
9 9	
1 1 2 2	