



USACO 2021 JANUARY CONTEST, PLATINUM PROBLEM 2. MINIMUM COST PATHS

[Return to Problem List](#)

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English (en) ▾

Farmer John's pasture can be regarded as an $N \times M$ ($2 \leq N \leq 10^9$, $2 \leq M \leq 2 \cdot 10^5$) 2D grid of square "cells" (picture a huge chessboard). The cell at the x -th row from the top and y -th column from the right is denoted by (x, y) for each $x \in [1, N]$, $y \in [1, M]$. Furthermore, for each $y \in [1, M]$, the y -th column is associated with the cost c_y ($1 \leq c_y \leq 10^9$).

Bessie starts at the cell $(1, 1)$. If she is currently located at the cell (x, y) , then she may perform one of the following actions:

- If $y < M$, Bessie may move to the next column (increasing y by one) for a cost of x^2 .
- If $x < N$, Bessie may move to the next row (increasing x by one) for a cost of c_y .

Given Q ($1 \leq Q \leq 2 \cdot 10^5$) independent queries each of the form (x_i, y_i) ($x_i \in [1, N]$, $y_i \in [1, M]$), compute the minimum possible total cost for Bessie to move from $(1, 1)$ to (x_i, y_i) .

INPUT FORMAT (input arrives from the terminal / stdin):

The first line contains N and M .

The second line contains M space-separated integers c_1, c_2, \dots, c_M .

The third line contains Q .

The last Q lines each contain two space-separated integers x_i and y_i .

OUTPUT FORMAT (print output to the terminal / stdout):

Q lines, containing the answers for each query.

Note that the large size of integers involved in this problem may require the use of 64-bit integer data types (e.g., a "long long" in C/C++).

SAMPLE INPUT:

```
5 4
1 100 100 20
20
1 1
2 1
3 1
4 1
5 1
1 2
2 2
3 2
4 2
5 2
1 3
2 3
3 3

4 3
5 3
1 4
2 4
3 4
4 4
```

SAMPLE OUTPUT:

0
 1
 2
 3
 4
 1
 5
 11
 19
 29
 2
 9
 20
 35
 54
 3
 13
 29
 49
 69

The output in grid format:

```

    1  2  3  4
  *--*--*--*--*
1 | 0 | 1 | 2 | 3 |
  *--*--*--*--*
2 | 1 | 5 | 9 |13 |
  *--*--*--*--*
3 | 2 |11 |20 |29 |
  *--*--*--*--*
4 | 3 |19 |35 |49 |
  *--*--*--*--*
5 | 4 |29 |54 |69 |
  *--*--*--*--*
```

SCORING:

- Test cases 1-3 satisfy $N, M \leq 2000$.
- Test cases 4-8 satisfy $c_2 > c_3 > \dots > c_M$.
- Test cases 9-15 satisfy $N \leq 2 \cdot 10^5$.
- Test cases 16-20 satisfy no additional constraints.

Problem credits: Benjamin Qi

Contest has ended. No further submissions allowed.