Problem E: PCB

In designing a printed circuit board (PCB), each consumer must be connected to a power supply via conductive wires. The PCB is a rectangle of width W and height H. It is represented as a grid of integer coordinates from $(0, 0)$ to $(W + 1, H + 1)$.

There are n power supplies along the left edge of the board and n consumers each located somewhere inside the board. The i^{th} power supply is located at position $(0, h_i)$ and the i^{th} consumer is located at position (x_i, y_i). Each power supply must connect to exactly one consumer and vice versa.

Each wire must run along the grid lines, bending at most once. i.e., each wire is either a straight vertical or horizontal line or makes exactly one 90-degree turn, forming an "L" shape. Wires cannot cross or overlap with each other anywhere along their paths.

Your task is to determine a matching between power supplies and consumers such that the total length of all wires is minimized.

Input

The input consists of several lines:

- The first line contains three integers W, H and n ($1 \leqslant W, H \leqslant 10^8$; $1 \leqslant n \leqslant 10^6$).
- Each of the next n lines contains an integer h_i ($1 \leqslant h_i \leqslant H$).
- Each of the next n lines contains two integers x_i and y_i ($1 \leqslant x_i \leqslant W$; $1 \leqslant y_i \leqslant H$).

It is guaranteed that each point in the board contains at most one power supply or consumer. Moreover, no two consumers i and j exist where $x_i = x_j$.

Output

If it is not possible to find such a matching under the given constraints, output a single line containing -1.

Otherwise, output a single line containing n space-separated integers. The i^{th} integer describes p_i, indicating that power supply i is connected to consumer p_i.

Example

Standard Input	Standard Output
5 5 2 2 4 3 2 5 4	1 2
10 10 5 9 6 2 8 1 2 3 5 8 3 8 4 8 1 2	2 4 5 3 1