Problem H
Light Control System

There are N shops, numbered from 1 to N, that sell lamp switches. There are also M lamps, numbered from 1 to M, that are initially switched off.

When you buy and use a switch from shop i, it will **toggle all** lamps in the set S_i. When you toggle a lamp, it will become on if it is currently off, and it will become off if it is currently on.

You have to answer Q queries, each giving you a range L and R. You have to find the minimum $r - l + 1$, such that $L \leq l \leq r \leq R$ and there exists a subset $T \subseteq \{l, l+1, \ldots, r\}$ and by buying switches from all shops $t \in T$, you can switch on all the lamps.

You have to answer each query or report that it is impossible.

Input

The first line contains three integers N, M, and Q ($1 \leq N \leq 50\,000$; $1 \leq Q \leq 100\,000$; $1 \leq M \leq 30$). Each of the next N lines contains an integer k_i ($1 \leq k_i \leq M$), followed by k_i integers between 1 and M representing S_i, containing the lamp numbers that can be toggled by buying a switch from shop i.

The next Q lines contain the queries, each giving you two integers L and R ($1 \leq L \leq R \leq N$) in a line.

Output

For each query, output an integer representing the minimum value, or -1 if it is impossible.

Sample Input 1	Sample Output 1
5 3 3 1 3 2 1 2 2 1 3 1 1 1 2 1 5 3 4 2 5	2 -1 3

Explanation of Sample 1: For the first query, you can pick $l = 1$ and $r = 2$, then you buy the switches from shop 1 and 2.

For the second query, there is no way to pick any l and r from the range $3 \leq l \leq r \leq 4$ such that you can buy switches that toggle all M lamps. Therefore you have to output -1.

For the third query, you can pick $l = 2$ and $r = 4$, then you buy the switches from shop 2, 3, and 4. It is also possible to pick $l = 3$ and $r = 5$, then you buy the switches from shop 3 and 5. Both ways give you $r - l + 1 = 3$.

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