

Expiring Session

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 256 megabytes

The judging system opens a session for a participant the first time they log in, at time 0. The security team has configured two values for these sessions:

- **idle**: the maximum time a session may remain unused;
- **maxLife**: the maximum time a session may last after being created.

Initially, the session's last use time is 0. If its last use was at time *lastActivity*, its current expiration time is

$$\min(\text{lastActivity} + \text{idle}, \text{maxLife}).$$

The session is already closed at its expiration time. In other words, a request at time *T* is accepted only if *T* is **strictly smaller** than the current expiration time.

During the contest one participant sends *K* requests, at strictly increasing integer times. Process the requests in order:

- If the session has expired, print -1. The session stays closed, so no later request can open it again.
- Otherwise, the request is accepted. Set **lastActivity** to its time and print the session's remaining life immediately after processing the request.

Input

The first line contains three integers *idle*, *maxLife*, and *K* ($1 \leq \text{idle}, \text{maxLife} \leq 10^6$, $1 \leq K \leq 2 \cdot 10^5$) — the idle limit, the absolute life limit, and the number of requests.

The second line contains *K* integers $T_1, T_2, \dots, T_K$ ($1 \leq T_i \leq 10^6$, $T_i < T_{i+1}$) — the request times.

Output

Print *K* lines. For each request, print -1 if the session is closed. Otherwise, print its remaining life immediately after processing that request:

$$\min(T_i + \text{idle}, \text{maxLife}) - T_i.$$

Examples

standard input	standard output
10 100 4 3 9 18 27	10 10 10 10
5 100 3 4 9 10	5 -1 -1
100 10 3 1 5 9	9 5 1

Note

In the second example, the request at time 4 is accepted and moves the expiration time to 9. The next request occurs exactly at time 9, so the session is already closed. The final request cannot open it again.

In the third example, the absolute life limit is reached before the idle limit. Therefore, the reported remaining life decreases as the requests approach time 10.