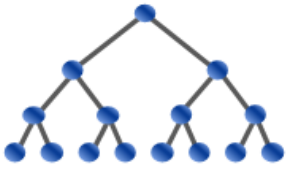
USA Computing Olympiad



USACO 2024 FEBRUARY CONTEST, PLATINUM
PROBLEM 3. INFINITE ADVENTURE

Return to Problem List

Contest has ended.

Log in to allow submissions in analysis mode

English (en)

****Note: The memory limit for this problem is 512MB, twice the default.****

Bessie is planning an infinite adventure in a land with N ($1 \le N \le 10^5$) cities. In each city i, there is a portal, as well as a cycling time T_i. All T_i's are powers of 2, and $T_1 + \cdots + T_N \le 10^5$. If you enter city i's portal on day t, then you instantly exit the portal in city $c_{i,t \bmod T_i}$.

Bessie has Q ($1 \le Q \le 5 \cdot 10^4$) plans for her trip, each of which consists of a tuple (v, t, Δ). In each plan, she will start in city v on day t. She will then do the following Δ times: She will follow the portal in her current city, then wait one day. For each of her plans, she wants to know what city she will end up in.

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

The first line contains two space-separated integers: N, the number of nodes, and Q, the number of queries.

The second line contains N space-separated integers: $T_1, T_2, \ldots, T_N$ ($1 \le T_i$, T_i is a power of 2, and $T_1 + \cdots + T_N \le 10^5$).

For $i = 1, 2, \ldots, N$, line $i+2$ contains T_i space-separated positive integers, namely $c_{i,0}, \ldots, c_{i,T_i-1}$ ($1 \le c_{i,t} \le N$).

For $j = 1, 2, \ldots, Q$, line $j+N+2$ contains three space-separated positive integers, v_j, t_j, Δ_j ($1 \le v_j \le N$, $1 \le t_j \le 10^{18}$, and $1 \le \Delta_j \le 10^{18}$) representing the jth query.

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

Print Q lines. The jth line must contain the answer to the jth query.

SAMPLE INPUT:

```
5 4
1 2 1 2 8
2
3 4
4
2 3
5 5 5 5 5 1 5 5
2 4 3
3 3 6
5 3 2
5 3 7
```

SAMPLE OUTPUT:

```
2
2
5
4
```

Bessie's first three adventures proceed as follows:

- In the first adventure, she goes from city 2 at time 4 to city 3 at time 5, to city 4 at time 6, to city 2 at time 7.
- In the second adventure, she goes from city 3 at time 3 to city 4 at time 4, to city 2 at time 5, to city 4 at time 6, to city 2 at time 7, to city 4 at time 8, to city 2 at time 9.
- In the third adventure, she goes from city 5 at time 3 to city 5 at time 4, to city 5 at time 5.

SAMPLE INPUT:

```
5 5
1 2 1 2 8
2
3 4
4
2 3
```

```
5 5 5 5 5 1 5 5
2 4 3
3 2 6
5 3 2
5 3 7
5 3 1000000000000000000
```

SAMPLE OUTPUT:

```
2
3
5
4
2
```

SCORING:

- Input 3: $\Delta_j \leq 2 \cdot 10^2$.
- Inputs 4-5: $N, \sum T_j \leq 2 \cdot 10^3$.
- Inputs 6-8: $N, \sum T_j \leq 10^4$.
- Inputs 9-18: No additional constraints.

Problem credits: Brandon Wang

Contest has ended. No further submissions allowed.