Cycle detection P30452_en

For any function f that maps a finite set to itself, and for any initial value x_0 in the set, the sequence of values x_0, $x_1 = f(x_0)$, $x_2 = f(x_1)$, ..., $x_k = f(x_{k-1})$, ... eventually repeats some values, i.e., there is some $i \geq 0$ and some $j > i$ such that $f(x_j) = f(x_i)$. Once this happens, the sequence continues by repeating the cycle from x_i to x_{j-1}.

For instance, the function that maps $(0, 1, 2, 3, 4, 5, 6, 7, 8)$ to $(6, 6, 0, 1, 4, 3, 3, 4, 0)$ generates the following sequence when $x_0 = 2$:

$$2\ 0\ 6\ 3\ 1\ 6\ 3\ 1\ 6\ 3\ 1\ \ldots$$

In this sequence, the beginning of the cycle $(6\ 3\ 1)$ is found after 2 steps. In this case, $i = 2$, $j = 5$, and the periodicity is $j - i = 3$.

Given a function that maps the interval $[0, n-1]$ to itself, and several starting values x_0, compute the corresponding values of $j - i$ and i.

Input

Input starts with the number of cases. Every such case begins with two integer numbers $1 \leq n \leq 10^5$ and $0 \leq k \leq 10n$. Follow, in order, the n images of the numbers in $[0, n-1]$. Follow k numbers: the x_0's for which the result must be computed.

Output

For every case, print its number and k lines each one with $j - i$ and i.

Observation

Since some of the private cases are huge, a recursive program may exhaust the recursion stack.

Sample input 1

```
3
9 1
6 6 0 1 4 3 3 4 0
2
3 3
2 1 0
0 1 2
4 3
1 2 3 2
1 0 1
```

Sample output 1

```
Case #1:
 3 2
Case #2:
 2 0
 1 0
 2 0
Case #3:
 2 1
 2 2
 2 1
```

Problem information

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