Hidden Sequence Rotation

Input file:	standard input
Output file:	standard output
Time limit:	2 seconds
Memory limit:	1024 megabytes

This is an **interactive problem** (a problem where your program interacts with the judge via standard input/output).

You are given an integer N. The judge holds a hidden sequence $A = (A_0, \ldots, A_{N-1})$ of length N, where each element is an integer between 1 and 10^5. Note that throughout the problem, indices are 0-based.

For integers $s = 0, \ldots, N-1$ and $l = 1, \ldots, N$, define the sequence $A(s, l)$ as follows:

- A sequence of length l whose i-th element is $A_{(s+i) \bmod N}$ for $i = 0, \ldots, l-1$.

You can make up to **20 queries** to the judge in the following format:

- You output a list of integer pairs $((s_0, l_0), \ldots, (s_{k-1}, l_{k-1}))$ that satisfies the following constraints:

  - $1 \le k \le N$
  - $0 \le s_i \le N - 1$
  - $1 \le l_i \le N$
  - $\sum_{i=0}^{k-1} l_i \le N$

- In response, the judge returns all indices $i = 0, \ldots, k - 1$ such that $A(s_i, l_i)$ is lexicographically minimal among the sequences. In other words, the judge returns the set $\{i \mid 0 \le i < k, \ A(s_i, l_i) = \min_{0 \le i' < k} A(s_{i'}, l_{i'})\}$.

Using these queries, determine all values of $s = 0, \ldots, N-1$ such that $A(s, N)$ is lexicographically minimal. In other words, identify the set $\{s \mid 0 \le s < N, \ A(s, N) = \min_{0 \le s' < N} A(s', N)\}$.

Note that the judge is **not adaptive**, meaning the sequence A is fixed before the interaction for each test case.

Input

The input is given in the following format:

N

- N is an integer in the range $1 \le N \le 10^5$.

Output

Once you have determined the answer, output it in the following format:

```
! n
s_0
s_1
:
s_{n-1}
```

Here, n is an integer, each s_i is a distinct integer in the range $0 \le s_i < N$, and it must be satisfied that

$$\{s_0, \ldots, s_{n-1}\} = \{s \mid 0 \le s < N, \, A(s, N) = \min_{0 \le s' < N} A(s', N)\}.$$

Interaction Protocol

You may issue queries by outputting them to standard output in the following format:

```
? k
s_0 l_0
s_1 l_1
⋮
s_{k-1} l_{k-1}
```

Ensure that your queries satisfy the conditions described above.

If the query is valid, the judge will respond with:

```
k′
i_0
i_1
⋮
i_{k′-1}
```

Here, it holds that $k', i_0, i_1, \ldots, i_{k'-1}$ are integers, $0 \le i_0 < i_1 < \cdots < i_{k'-1} < k$, and

$$\{i_0, i_1, \ldots, i_{k'-1}\} = \{i \mid 0 \le i < k, \, A(s_i, l_i) = \min_{0 \le i' < k} A(s_{i'}, l_{i'})\}.$$

If your query is invalid (for example, if it violates the constraints or exceeds the allowed number of queries), the judge will respond with:

```
-1
```

If `-1` is received, terminate your program immediately.

Notes for Interaction

- Be sure to flush the output after every print. Failure to do so may result in a Time Limit Exceeded (TLE) verdict.

- If your program produces invalid output or exits improperly during interaction, the judge's behavior is undefined.

- After printing the final answer or receiving `-1`, your program must terminate immediately. Failure to do so may result in undefined behavior.

- Avoid unnecessary newlines or spaces in your output, as these may be treated as formatting errors.

Note

The following is an example interaction for $N = 6$, with the hidden sequence $A = (1, 2, 3, 1, 2, 4)$:

Input	Output	Description
6		N is given.
	? 3 0 1 1 1 3 1	Querying sequences (1), (2), and (1).
2 0 2		Sequences at index 0 and 2 are lexicographically smallest.
	? 2 0 3 3 3	Querying sequences $(1, 2, 3)$ and $(1, 2, 4)$.
1 0		Sequence at index 0 is lexicographically smallest.
	! 1 0	Only $s = 0$ lexicographically minimizes the sequence $A(s, N)$, so that is printed as output.