

Power Functions - MathGames

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Difficulty: ★ ★ ★ ☆ ☆

Key words: Set theory

This is an interactive problem.

Consider the set $[n] = \{1, \dots, n\}$ and an order preserving function

$$f : \mathcal{P}([n]) \rightarrow \mathcal{P}([n]),$$

where $\mathcal{P}([n])$ denotes the power set of $[n]$. Then, an order preserving function f is a function such that for $A \subseteq B \subseteq [n]$, $f(A) \subseteq f(B)$. It is known that such a function always has a fixed point. However, we are now interested in finding such a fixed point. The computer knows some secret function and you can request values of f by giving it some (ordered) subset of $[n]$. The computer responds with the value of f . Find a fixed point in $n + 3$ guesses.

A non-empty set is given by one integer with digits $1 \leq d \leq 9$ sorted from smallest to largest digit. The digits in each number represent the elements present in the set. The empty set is specified by a 0.

Input

- One line with as input $1 \leq n \leq 9$ the size of the set.
- Then, for each set you guess, the program replies with the result of the function f . The program should terminate when it receives an output that matches the input.

Output

- A subset of $[n]$ you want to guess.

Examples

In the below examples, we have put each in/output on its own line, so that it is clear in what order the in and output is given.

Input	Output
4	1234 0
0	
0	

Input	Output
2	1 12
12	
12	