Given the following formula, one can set operators '+' or '-' instead of each '?', in order to obtain a given k

$$?1?2?\ldots?n = k$$

For example: to obtain $k = 12$, the expression to be used will be:

```
- 1 + 2 + 3 + 4 + 5 + 6 - 7 = 12
```

with $n = 7$

Input

The first line is the number of test cases, followed by a blank line.

Each test case of the input contains an integer k ($0 \leq |k| \leq 1000000000$).

Each test case will be separated by a single line.

Output

For each test case, your program should print the minimal possible n ($1 \leq n$) to obtain k with the above formula.

Print a blank line between the outputs for two consecutive test cases.

Sample Input

```
2

12

-3646397
```

Sample Output

```
7

2701
```