

The Hendrie Sequence “H” is a self-describing sequence defined as follows:

- $H(1) = 0$
- If we expand every number  $x$  in H to a subsequence containing  $x$  0's followed by the number  $x + 1$ , the resulting sequence is still H (without its first element).

Thus, the first few elements of H are:

0,1,0,2,1,0,0,3,0,2,1,1,0,0,0,4,1,0,0,3,0,...

You must write a program that, given  $n$ , calculates the  $n$ th element of H.

## Input

Each test case consists of a single line containing the integer  $n$  ( $0 < n < 2^{63}$ ) . Input is terminated with a line containing the number ‘0’ which of course should not be processed.

## Output

For each test case, output the  $n$ th element of H on a single line.

## Sample Input

```
4
7
44
806856837013209088
0
```

## Sample Output

```
2
0
3
16
```