10479   The Hendrie Sequence

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 nth 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 nth element of H on a single line.

Sample Input

```
4
7
44
806856837013209088
0
```

Sample Output

```
2
0
3
16
```