Problem G

Hendrie Sequence

Time Limit: 3 seconds

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 0s 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	Output for Sample Input
4 **7** **44** **806856837013209088** **0**	**2** **0** **3** **16**

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