

Binary [II]

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

points: 100 · problem code: binary2 · author: glipR

The blurb for this problem is the same as Binary Sequences [I], save for the statement of the problem.

This set of problems is centered around a sequence generated in the following manner:

1. Take all natural numbers in increasing order
2. Replace each natural number with its binary representation
3. Concatenate these into a single sequence

For example, the first 4 natural numbers generate the first 8 digits in the sequence: 11011100.

The first digit is 1, for 1. The next two are 10, for 2. The next two are 11, for 3, and the final three are 100, for 4.

In this second problem, we want to find the number of 1s that occur in the sequence at or before index i . So if we kept a running total of the prefix sums of our sequence, we'd get:

12234555

as the first 8 digits.

Input

Input will consist of a single natural number i .

Output

Output a single integer, representing the number of 1s in the sequence at or before (1-indexed) index i .

Constraints

- $1 \leq i \leq 10^{18}$

Examples

Input

3

Output

2

Input

4

Output

3

Input

8

Output

5