

The triangle of Pascal modulo 2

Consider Pascal's triangle modulo 2. The first nine rows are given below:

```
  1
 1 1
1 0 1
1 1 1 1
1 0 0 0 1
1 1 0 0 1 1
1 0 1 0 1 0 1
1 1 1 1 1 1 1 1
1 0 0 0 0 0 0 0 1
```

Let $F(n)$ be the number of 1 in the first n rows. So that $F(0) = 0$, $F(1) = 1$, $F(2) = 3$, etc.

Given a , find the smallest integer n such that $F(n) \geq a$. Let $N(a)$ denote this integer.

Input

A list of integers a_1, \dots, a_j , between 0 and 10^{18} , one per line.

Output

The integers $N(a_1), \dots, N(a_j)$, one per line.

Example

input:

```
0
1
4
15
```

output:

```
0
1
3
6
```