

We define the parity of an integer  $n$  as the sum of the bits in binary representation computed modulo two. As an example, the number  $21 = 10101_2$  has three 1s in its binary representation so it has parity  $3 \pmod{2}$ , or 1.

In this problem you have to calculate the parity of an integer  $1 \leq I \leq 2147483647$ .

## Input

Each line of the input has an integer  $I$  and the end of the input is indicated by a line where  $I = 0$  that should not be processed.

## Output

For each integer  $I$  in the input you should print a line 'The parity of  $B$  is  $P \pmod{2}$ .' , where  $B$  is the binary representation of  $I$ .

## Sample Input

```
1
2
10
21
0
```

## Sample Output

```
The parity of 1 is 1 (mod 2).
The parity of 10 is 1 (mod 2).
The parity of 1010 is 2 (mod 2).
The parity of 10101 is 3 (mod 2).
```