Problem F Time limit: 1.0 second

SpaceX Satellites

SpaceX wants to send a fleet of satellites into space to collect all your personal data. Every piece of data transmitted back to Earth is represented as a sequence of bits (0s and 1s). Since the data can be humongous, SpaceX employs a proprietary state-based encrypting system to represent this bit sequence before transmission.

Initially, the satellite transmitter starts with the triple (1, 1, 1). It then processes the bit sequence one bit at a time from left to right:

* If the bit is **0**, the triple (x, y, z) is transformed to $(y, z, x + z)$.
* If the bit is **1**, the triple (x, y, z) is transformed to $(x + z + 1, x + y + z + 1, x + y + 2z + 1)$.

Unfortunately, data corruption occurred during interstellar transmission, and the satellite could only transmit back the last number of the resulting triple, z. Given this number z, determine the minimal-length bit sequence that results in such a triple with the third element equal to z.

Input

The input consists of a single integer z ($1 \le z \le 10^{18}$).

Output

Output a single line containing a bit sequence consisting of **0** and **1**. (If the sequence is empty, output an empty line).

Sample Cases

Sample 1 - Input	Sample 1 - Output
`2`	`0`

Sample 2 - Input	Sample 2 - Output
`7`	`01`

Sample 3 - Input	Sample 3 - Output
`18`	`11`

Sample Explanations

1. In Sample 1: Starting from (1, 1, 1), bit **0** transforms the triple to (1, 1, 1 + 1) = (1, 1, 2) with $z = 2$.
2. In Sample 2: Starting from (1, 1, 1), bit **0** yields (1, 1, 2), then bit **1** transforms it to (4, 5, 7) with $z = 7$.
3. In Sample 3: Starting from (1, 1, 1), bit **1** yields (3, 4, 5), then bit **1** transforms it to (9, 13, 18) with $z = 18$.