NEG2 - The Moronic Cowmpouter

Inexperienced in the digital arts, the cows tried to build a calculating engine (yes, it's a cowmpouter) using binary numbers (base 2) but instead built one based on base negative 2! They were quite pleased since numbers expressed in base -2 do not have a sign bit.

You know number bases have place values that start at 1 (base to the 0 power) and proceed right-to-left to base^1, base^2, and so on. In base -2, the place values are 1, -2, 4, -8, 16, -32, ... (reading from right to left). Thus, counting from 1 goes like this: 1, 110, 111, 100, 101, 11010, 11011, 11000, 11001, and so on.

Eerily, negative numbers are also represented with 1's and 0's but no sign. Consider counting from -1 downward: 11, 10, 1101, 1100, 1111, and so on.

Please help the cows convert ordinary decimal integers (range -2,000,000,000 .. 2,000,000,000) to their counterpart representation in base -2.

Input

A single integer n to be converted to base -2

Output

A single integer with no leading zeroes that is the input integer converted to base -2. The value 0 is expressed as 0, with exactly one 0.

Example

Input:
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-13
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Output:
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110111
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Objectives

Complexity in O(logn) and a pseudo-code is to be provided.