

## Problem: Balanced Trees.

11<sup>th</sup> & 12<sup>th</sup> grades. Send solution to [raidel.marichal@gmail.com](mailto:raidel.marichal@gmail.com) before 11:00 pm

### Problem Description

Trees have many fascinating properties. While this is primarily true for trees in nature, the concept of trees in math and computer science is also interesting. A particular kind of tree, a perfectly balanced tree, is defined as follows.

Every perfectly balanced tree has a positive integer weight. A perfectly balanced tree of weight 1 always consists of a single node. Otherwise, if the weight of a perfectly balanced tree is  $w$  and  $w \leq 2$ , then the tree consists of a root node with branches to  $k$  subtrees, such that  $2 \leq k \leq w$ . In this case, all  $k$  subtrees must be completely identical, and be perfectly balanced themselves.

In particular, all  $k$  subtrees must have the same weight. This common weight must be the maximum integer value such that the sum of the weights of all  $k$  subtrees does not exceed  $w$ , the weight of the overall tree. For example, if a perfectly balanced tree of weight 8 has 3 subtrees, then each subtree would have weight 2, since  $2 + 2 + 2 = 6 \leq 8$ .

Given  $N$ , find the number of perfectly balanced trees with weight  $N$ .

### Input Specification

The input will be a single line containing the integer  $N$  ( $1 \leq N \leq 10^9$ ).

For 5 of the 15 marks available,  $N \leq 1000$ .

For an additional 2 of the 15 marks available,  $N \leq 50000$ .

For an additional 2 of the 15 marks available,  $N \leq 10^6$ .

### Output Specification

Output a single integer, the number of perfectly balanced trees with weight  $N$ .

### Sample Input 1

4

### Output for Sample Input 1

3

### Explanation for Output for Sample Input 1

One tree has a root with four subtrees of weight 1; a second tree has a root with two subtrees of weight 2; the third tree has a root with three subtrees of weight 1.

### Sample Input 2

10

### Output for Sample Input 2

13