Problem A. Alternative Permutations

Input file:	*standard input*
Output file:	*standard output*
Time limit:	8 seconds
Memory limit:	256 mebibytes

Johnny wrote a permutation to binary search trees (BST) converter: given a permutation $(\pi_1, \pi_2, \ldots, \pi_n)$ it assigns π_1 to the root of the BST, from numbers in $(\pi_2, \pi_3, \ldots, \pi_n)$ smaller than π_1 (in the same order!) it recursively creates a BST and attaches it as a left subtree of the root; symmetrically, from numbers in $(\pi_2, \pi_3, \ldots, \pi_n)$ larger than π_1 it also creates a BST and attaches it as a right subtree of th root.

To Johnny's surprise, it turns out that different permutations can result in the same BST – for instance the permutations $(2, 3, 1)$ and $(2, 1, 3)$ result in the same BST. He found this fact astonishing and immediately defined Johnny's Numbers J_k: the k-th Johnny's Number is the smallest n such that there is a BST on n nodes labelled with numbers $1, 2, \ldots, n$, that can be obtained from exactly k different permutations of the numbers $1, 2, \ldots, n$.

The investigation of Johnny's Numbers is difficult and their popularity is decreasing. Help Johnny out–compute Johnny's Number J_k for the given k.

Input

The first line of input consists a single natural number k ($1 \le k \le 10^{11}$).

Output

In the first line of the input print a single positive integer: k-th Johnny's Number J_k, assuming that it exists and it is at most 5 000. Second line of the input must contain J_k integers — lexicographically minimal generating permutation between k ones.

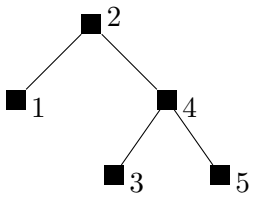
Otherwise, that is if J_k does not exists or it is larger than 5 000 you should write the word "`NIE`" (Polish for 'no').

Example

standard input	standard output
8	5 2 1 4 3 5

Note

The tree having exactly eight generating permutations is shown below:



All permutations generating that tree are: $(2, 1, 4, 3, 5)$, $(2, 1, 4, 5, 3)$, $(2, 4, 1, 3, 5)$, $(2, 4, 1, 5, 3)$, $(2, 4, 3, 1, 5)$, $(2, 4, 3, 5, 1)$, $(2, 4, 5, 1, 3)$, $(2, 4, 5, 3, 1)$.