Problem H. Sets

Input file: standard input
Output file: standard output
Time limit: 1s

For a fixed number n, we define $S_1(n)$ as the set of integers $1, 2, \cdots, n$. And for any $i > 1$, we define $S_i(n)$ as a set containing all sums of two different numbers in $S_{i-1}(n)$, e.g. e.g., $S_i(n) = \{x+y : \exists x, y \text{ in } S_{i-1}(n) \text{ such that } x \neq y\}$.

For example, if $n = 3$, we have

$$\begin{aligned} S_1(n) &= \{1, 2, 3\}, \\ S_2(n) &= \{3, 4, 5\}, \\ S_3(n) &= \{7, 8, 9\}, \\ S_4(n) &= \{15, 16, 17\}. \end{aligned}$$

Then, we sort each set respectively, and combine them in order into a sequence L. In above case, we have the sequence $L = 1, 2, 3, 3, 4, 5, 7, 8, 9, 15, 16, 17, \cdots$.

Now, given integers n and k, what is the k-th number in sequence L?

Input

The input file contains several test cases, please handle it to the end of file.

For each case, there is only one line containing two integers n and k ($n \leq 1000, k \leq 10^{1000}$).

Output

For each case, output one integer indicating the k-th number of the sequence. Output -1 if it does not exist.

Example

standard input	standard output
4 6 2 20	4 -1