

E. Beads

time limit per test: 5 seconds
memory limit per test: 64 megabytes

One Martian boy called Zorg wants to present a string of beads to his friend from the Earth — Masha. He knows that Masha likes two colours: blue and red, — and right in the shop where he has come, there is a variety of adornments with beads of these two colours. All the strings of beads have a small fastener, and if one unfastens it, one might notice that all the strings of beads in the shop are of the same length. Because of the peculiarities of the Martian eyesight, if Zorg sees one blue-and-red string of beads first, and then the other with red beads instead of blue ones, and blue — instead of red, he regards these two strings of beads as identical. In other words, Zorg regards as identical not only those strings of beads that can be derived from each other by the string turnover, but as well those that can be derived from each other by a mutual replacement of colours and/or by the string turnover.

It is known that all Martians are very orderly, and if a Martian sees some amount of objects, he tries to put them in good order. Zorg thinks that a red bead is smaller than a blue one. Let's put 0 for a red bead, and 1 — for a blue one. From two strings the Martian puts earlier the string with a red bead in the i -th position, providing that the second string has a blue bead in the i -th position, and the first two beads $i - 1$ are identical.

At first Zorg unfastens all the strings of beads, and puts them into small heaps so, that in each heap strings are identical, in his opinion. Then he sorts out the heaps and chooses the minimum string in each heap, in his opinion. He gives the unnecessary strings back to the shop assistant and says he doesn't need them any more. Then Zorg sorts out the remaining strings of beads and buys the string with index k .

All these manipulations will take Zorg a lot of time, that's why he asks you to help and find the string of beads for Masha.

Input

The input file contains two integers n and k ($2 \leq n \leq 50; 1 \leq k \leq 10^{16}$) — the length of a string of beads, and the index of the string, chosen by Zorg.

Output

Output the k -th string of beads, putting 0 for a red bead, and 1 — for a blue one. If it's impossible to find the required string, output the only number -1 .

Examples

input	Copy
4 4	
output	Copy
0101	

Note

Let's consider the example of strings of length 4 — 0001, 0010, 0011, 0100, 0101, 0110, 0111, 1000, 1001, 1010, 1011, 1100, 1101, 1110. Zorg will divide them into heaps: {0001, 0111, 1000, 1110}, {0010, 0100, 1011, 1101}, {0011, 1100}, {0101, 1010}, {0110, 1001}. Then he will choose the minimum strings of beads in each heap: 0001, 0010, 0011, 0101, 0110. The forth string — 0101.

→ Attention

The package for this problem was not updated by the problem writer or Codeforces administration after we've upgraded the judging servers. To adjust the time limit constraint, a solution execution time will be multiplied by 2. For example, if your solution works for 400 ms on judging servers, then the value 800 ms will be displayed and used to determine the verdict.

Codeforces Beta Round 8

Finished

Practice



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Language: GNU G++23 14.2 (64 bit, ms) ▼

Choose file: [Choose File](#) No file chosen

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Submission	Time	Verdict
325126185	Jun/19/2025 12:36	Accepted
325124515	Jun/19/2025 12:23	Wrong answer on test 3

325124130	Jun/19/2025 12:20	Time limit exceeded on test 52
325123387	Jun/19/2025 12:14	Wrong answer on test 1

→ **Problem tags**

dp graphs *2600

No tag edit access

→ **Contest materials**

- Codeforces Beta Round #8 ✕
- Tutorial (en) ✕

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