Given two positive integers n and k, the binary string  Sn is formed as follows:

* S1 = "0"
* Si = Si-1 + "1" + reverse(invert(Si-1)) for i > 1

Where + denotes the concatenation operation, reverse(x) returns the reversed string x, and invert(x) inverts all the bits in x (0 changes to 1 and 1 changes to 0).

For example, the first 4 strings in the above sequence are:

* S1= "0"
* S2= "0**1**1"
* S3= "011**1**001"
* S4 = "0111001**1**0110001"

Return *the* kth *bit* *in* Sn. It is guaranteed that k is valid for the given n.

**Example 1:**

**Input:** n = 3, k = 1

**Output:** "0"

**Explanation:** S3 is "**0**111001". The first bit is "0".

**Example 2:**

**Input:** n = 4, k = 11

**Output:** "1"

**Explanation:** S4 is "0111001101**1**0001". The 11th bit is "1".

**Example 3:**

**Input:** n = 1, k = 1

**Output:** "0"

**Example 4:**

**Input:** n = 2, k = 3

**Output:** "1"

**Constraints:**

* 1 <= n <= 20
* 1 <= k <= 2n - 1