



## Problem 1. «A 1024-bit key»

Alice has a 1024-bit key for a symmetric cipher (the key consists of 0s and 1s). Alice is afraid of malefactors, so she changes her key everyday in the following way:

1. Alice chooses a subsequence of key bits such that the first bit and the last bit are equal to 0. She also can choose a subsequence of length 1 that contains only 0.
2. Alice inverts all the bits in this subsequence (0 turns into 1 and vice versa); bits outside of this subsequence remain as they are.

Prove that the process will stop. Find the key that will be obtained by Alice in the end of the process.

**Example of an operation.**  $11001\underbrace{01101110}011\dots$  turns to  $11001\underbrace{10010001}011\dots$

