ACM International Collegiate Programming Contest
ASIA Regional - Seoul

Problem A
Ducci Sequence

A *Ducci sequence* is a sequence of n-tuples of integers. Given an n-tuple of integers $(a_1, a_2, \cdots, a_n)$, the next n-tuple in the sequence is formed by taking the absolute differences of neighboring integers:

$$(a_1, a_2, \cdots, a_n) \rightarrow (|a_1 - a_2|, |a_2 - a_3|, \cdots, |a_n - a_1|)$$

Ducci sequences either reach a tuple of zeros or fall into a periodic loop. For example, the 4-tuple sequence starting with (8,11,2,7) takes 5 steps to reach the zeros tuple:

$$(8,11,2,7) \rightarrow (3,9,5,1) \rightarrow (6,4,4,2) \rightarrow (2,0,2,4) \rightarrow (2,2,2,2) \rightarrow (0,0,0,0).$$

The 5-tuple sequence starting with (4,2,0,2,0) enters a loop after 2 steps:

$$(4,2,0,2,0) \rightarrow (2,2,2,2,4) \rightarrow (\mathbf{0,0,0,2,2}) \rightarrow (0,0,2,0,2) \rightarrow (0,2,2,2,2) \rightarrow (2,0,0,0,2) \rightarrow$$
$$(2,0,0,2,0) \rightarrow (2,0,2,2,2) \rightarrow (2,2,0,0,0) \rightarrow (0,2,0,0,2) \rightarrow (2,2,0,2,2) \rightarrow (0,2,2,0,0) \rightarrow$$
$$(2,0,2,0,0) \rightarrow (2,2,2,0,2) \rightarrow (0,0,2,2,0) \rightarrow (0,2,0,2,0) \rightarrow (2,2,2,2,0) \rightarrow (\mathbf{0,0,0,2,2}) \rightarrow \cdots$$

Given an n-tuple of integers, write a program to decide if the sequence is reaching to a zeros tuple or a periodic loop.

Input

Your program is to read the input from standard input. The input consists of T test cases. The number of test cases T is given in the first line of the input. Each test case starts with a line containing an integer n ($3 \leq n \leq 15$), which represents the size of a tuple in the Ducci sequences. In the following line, n integers are given which represents the n-tuple of integers. The range of integers are from 0 to 1,000. You may assume that the maximum number of steps of a Ducci sequence reaching zeros tuple or making a loop does not exceed 1,000.

Output

Your program is to write to standard output. Print exactly one line for each test case. Print `LOOP` if the Ducci sequence falls into a periodic loop, print `ZERO` if the Ducci sequence reaches to a zeros tuple.

The following shows sample input and output for four test cases.

Sample Input	Output for the Sample Input
4	ZERO
4	LOOP
8 11 2 7	ZERO
5	LOOP
4 2 0 2 0	
7	
0 0 0 0 0 0 0	
6	
1 2 3 1 2 3	