

I – Interactive Reconstruction

Time limit: 2 s Memory limit: 256 MiB

This is an interactive task where your program will communicate with a grader through standard input and output. Your task is to reconstruct a labelled tree with N nodes and $N - 1$ edges. Nodes are labelled from 1 to N .

Your program is allowed to make a few queries of the following type: Your program should print a string of N characters, consisting only of zeros and ones, one corresponding to each node. The grader will return a sequence of N space-separated integers, the i -th representing the sum of the values (i.e. digits of the query string) of all neighbours of the i -th node. That is, if node j is a neighbour of node i , then the j -th digit of the query string counts towards the sum in the i -th number of the grader's answer.

See the example below for an illustration.

Input and output data

The first input line will contain the number N , the number of nodes in the tree.

Your program then has two options:

1. Print “QUERY” (without quotation marks), a space, and a string of N zeros and ones.
2. Print “ANSWER” (without quotation marks), a newline, and $N - 1$ lines, each containing a pair of space-separated integers a, b , indicating that there exists an edge between nodes a and b .

If your program prints a query, this will be followed by the grader returning a line with N space-separated integers, one per node. If your program prints an answer, the grader will check the returned tree for correctness.

If there was a mistake in your queries, either due to incorrect formatting or due to an exceeded number of queries, the grader will print “ERROR” (no quotation marks) instead of the answer.

Important: Ensure that your program flushes its output after printing and correctly exits after printing the answer. It is up to you whether to implement the **ERROR** handling. Its purpose is to allow your program to exit gracefully and get a WA instead of a TLE verdict in the case of an error.

Input limits

- $2 \leq N \leq 3 \cdot 10^4$
- At most $2 \uparrow\uparrow 3 = 2^{(2^2)} = 16$ queries are allowed. The final answer does not count toward this restriction.

Example

Program output

QUERY 10001

QUERY 00010

QUERY 10000

ANSWER

1 4

4 2

5 4

3 5

Grader output

5

0 0 1 2 0

1 1 0 0 1

0 0 0 1 0

Comment

The tree in question is the following one:

1-4-2

|

5-3

With the three queries in the example, it is possible to reconstruct it uniquely.