

Doremy's Experimental Tree

Input file: standard input
Output file: standard output
Time limit: 2.5 seconds
Memory limit: 256 megabytes

Doremy has an edge-weighted tree with n vertices whose weights are integers between 1 and 10^9 . She does $\frac{n(n+1)}{2}$ experiments on it.

In each experiment, Doremy chooses vertices i and j such that $j \leq i$ and connects them directly with an edge with weight 1. Then, there is exactly one cycle (or self-loop when $i = j$) in the graph. Doremy defines $f(i, j)$ as the sum of lengths of shortest paths from every vertex to the cycle.

Formally, let $\text{dis}_{i,j}(x, y)$ be the length of the shortest path between vertex x and y when the edge (i, j) of weight 1 is added, and $S_{i,j}$ be the set of vertices that are on the cycle when edge (i, j) is added. Then,

$$f(i, j) = \sum_{x=1}^n \left(\min_{y \in S_{i,j}} \text{dis}_{i,j}(x, y) \right).$$

Doremy writes down all values of $f(i, j)$ such that $1 \leq j \leq i \leq n$, then goes to sleep. However, after waking up, she finds that the tree has gone missing. Fortunately, the values of $f(i, j)$ are still in her notebook, and she knows which i and j they belong to. Given the values of $f(i, j)$, can you help her restore the tree?

It is guaranteed that at least one suitable tree exists.

Input

The first line of input contains a single integer n ($2 \leq n \leq 2000$) — the number of vertices in the tree.

The following n lines contain a lower-triangular matrix with i integers on the i -th line; the j -th integer on the i -th line is $f(i, j)$ ($0 \leq f(i, j) \leq 2 \cdot 10^{15}$).

It is guaranteed that there exists a tree whose weights are integers between 1 and 10^9 such that the values of $f(i, j)$ of the tree match those given in the input.

Output

Print $n - 1$ lines describing the tree. In the i -th line of the output, output three integers u_i , v_i , w_i ($1 \leq u_i, v_i \leq n$, $1 \leq w_i \leq 10^9$), representing an edge (u_i, v_i) whose weight is w_i .

If there are multiple answers, you may output any.

All edges must form a tree and all values of $f(i, j)$ must match those given in the input.

