Problem G. Gravity Zero Experiments

Time limit: 6 seconds
Memory limit: 1024 mebibytes

Scientists asked for your help to calculate possible outcomes of the experiment with gravity that will be conducted on the International Space Station.

There are n wooden bars fixed in the experiment room. Each bar is a non-empty segment in 3D space. It is guaranteed that no two bars are coplanar — that is, no plane contains both of them.

Initially, there is no gravity in the experiment room. When the experiment starts, gravity will be generated in some gravity direction $\overrightarrow{g}$.

The set of bars $B \subseteq \{1, 2, \ldots, n\}$ is called cyclic if it is possible to place a negligibly small ball on one of the bars at some point, move it with some sequence of operations visiting all bars from set B (any other bars may also be visited, each bar can be visited any number of times), and return to the same initial point.

The ball can be moved using the following operations:

- It can be moved to any other point on the bar it is currently located.
- It can be dropped from the bar; in this case, it will fall down in the gravity direction $\overrightarrow{g}$ and will stop at the nearest point of some other bar. It is allowed to drop the ball only if it will stop.

For every non-empty set of bars $B \subseteq \{1, 2, \ldots, n\}$, calculate if this set can be cyclic for some gravity direction $\overrightarrow{g}$.

Input

Each input consists of multiple test cases. The first line contains a single integer t ($1 \le t \le 1000$) — the number of test cases. Test case descriptions follow.

The first line of each test case contains a single integer n ($1 \le n \le 20$) — the number of bars in the experiment.

Each of the next n lines contains six integers $x_{i1}, y_{i1}, z_{i1}, x_{i2}, y_{i2}, z_{i2}$ ($-10^6 \le x_{i1}, y_{i1}, z_{i1}, x_{i2}, y_{i2}, z_{i2} \le 10^6$), describing the i-th bar. The i-th bar is the segment between points (x_{i1}, y_{i1}, z_{i1}) and (x_{i2}, y_{i2}, z_{i2}). It is guaranteed that $(x_{i1}, y_{i1}, z_{i1}) \neq (x_{i2}, y_{i2}, z_{i2})$.

It is guaranteed that no two bars are coplanar.

Let's define $\max n$ as the maximum value of n among test cases. The following bounds on t are guaranteed depending on $\max n$:

$\max n$	$[1, 6]$	$[7, 10]$	$[11, 15]$	$[16, 20]$
t	≤ 1000	≤ 50	≤ 5	≤ 1

Output

For each test case, print a binary string s of length $2^n - 1$. The value s_i should be 1 if and only if the set B_i corresponding to i is cyclic. The set B_i is the set of positions with 1 in the binary representation of i, i.e. $i = \sum_{b \in B_i} 2^{b-1}$.

Example

standard input	standard output
3 1 -1 1 -1 -1 -1 1 2 0 0 0 1 1 1 0 0 1 1 0 0 3 0 0 0 2 3 3 1 3 0 3 0 3 3 1 0 0 1 3	1 110 1111111