The 2021 Asia Jinan Regional Contest

Practice Session

November 13

Problems

A Addition

B Mengde’s Bridges

C Infinite Go

Do not open before the contest starts.

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Problem A. Addition

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	512 megabytes

The numbers in the computer are usually stored in binary form. But in Little A's computer, the numbers are stored in a different way.

The computer uses n bits to store a number. The value it stores is $\sum_{i=0}^{n-1} v_i \cdot sgn_i \cdot 2^i$, where v is an array of length n containing only 0 and 1, and sgn is a predefined array of length n containing only -1 and 1. It is not difficult to find that every expressible integer has a unique expression.

Little A gives you the binary representation of a and b in his computer, and you should report the binary representation of $a+b$ in his computer. When $max\{|a|,|b|\} \leq 10^8$, all integers in $[-10^9, 10^9]$ can be expressed in his computer.

Input

The first line contains an integer n, which represents the number of bits used to store an integer.

The second line contains n integers, and the i-th of them represents sgn_{i-1}.

The third line contains n integers, and the i-th of them represents va_{i-1}. The value of a is $\sum_{i=0}^{n-1} va_i \cdot sgn_i \cdot 2^i$.

The fourth line contains n integers, and the i-th of them represents vb_{i-1}. The value of b is $\sum_{i=0}^{n-1} vb_i \cdot sgn_i \cdot 2^i$.

It is guaranteed that $32 \leq n \leq 60$, $sgn_i \in \{-1, 1\}$, $va_i, vb_i \in \{0, 1\}$, and $max\{|a|,|b|\} \leq 10^8$.

Output

Output one line containing n integers, separated by spaces. The i-th of them represents $vc_{i-1} \in \{0, 1\}$. There should be no extra spaces at the end of the line.

Your solution should satisfy that $a + b = \sum_{i=0}^{n-1} vc_i \cdot sgn_i \cdot 2^i$.

Your output **must** be in a single line.

Example

standard input	standard output
32 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 -1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Note

There are no extra line breaks in the test cases. It is just for the convenience of displaying. The correct sample input and output format can be seen in the online statement.

Problem B. Mengde's Bridges

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	512 megabytes

Cao Mengde was defeated by Zhuge Kongming and Zhou Gongjin in the Battle of Chibi. But he would not give up. Mengde's army was still not good at water battles, so he came up with another idea. He built many artificial islands in the Yangtze River. Based on these islands, Mengde's army could easily attack Gongjin's troops. Mengde also built bridges to connect these islands. If all islands were connected by bridges, Mengde's army could become invincible in the Yangtze River.

Gongjin felt unacceptable with the situation. He wanted to destroy some of Mengde's bridges so one or more islands would be separated from other islands. But Gongjin had only one bomb that was left by Kongming, so he could only destroy a single bridge. Gongjin must send someone carrying the bomb to destroy a bridge. And there might be guards on the bridges. The soldier number of the bombing team could not be less than the number of guards on that bridge, or the mission would fail.

Please calculate the minimum number of soldiers Gongjin have to send to complete the mission of island separation.

Input

There are no more than 12 test cases.

In each test case:

The first line contains two integers, N and M ($2 \le N \le 1000$ and $0 < M \le N^2$) – the number of islands and bridges. All the islands are numbered from 1 to N.

The next M lines describe the M bridges. Each line contains three integers U, V, and W ($U \neq V$ and $0 \le W \le 10\,000$) – a bridge connecting island U and island V with W guards.

The input ends with $N = 0$ and $M = 0$.

Output

For each test case, print the minimum number of soldiers Gongjin had to send to complete the mission. If Gongjin could not succeed in any way, print -1 instead.

Example

standard input	standard output
3 3 1 2 7 2 3 4 3 1 4 3 2 1 2 7 2 3 4 0 0	-1 4

Problem C. Infinite Go

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	512 megabytes

Go is a proverbial board game that originated in China. It has been proved to be the most difficult board game in the world. "The rules of Go are so elegant, organic, and rigorously logical that if intelligent life forms exist elsewhere in the universe, they almost certainly play Go." said Emanuel Lasker, a famous chess master.

A Go board consists of 19 horizontal lines and 19 vertical lines. So there are 361 cross points. In the beginning, all cross points are vacant.

Go is played by two players. The basic rules are:

1. One player owns black stones and the other owns white stones.

2. Players place one of his stones on any vacant cross points of the board alternately. The player who owns black stones moves first.

3. Vertically and horizontally adjacent stones of the same color form a chain.

4. The number of vacant points adjacent (vertically or horizontally) to a chain is called the liberty of this chain. Once the chain has no liberty, it will be captured and removed from the board.

5. While a player places a new stone such that its chain immediately has no liberty, this chain will be captured at once unless this action will also capture one or more enemy's chains. In that case, the enemy's chains are captured, and this chain is not captured.

In effect, Go also has many advanced and complex rules. However, we only use these basic rules mentioned above in this problem.

Now we are going to deal with another game that is quite similar to Go. We call it "Infinite Go". The only difference is that the size of the board is no longer 19 times 19 – it becomes infinite. The rows are numbered 1, 2, 3, ..., from top to down, and columns are numbered 1, 2, 3, ..., from left to right. Notice that the board has neither row 0 nor column 0, which means even though the board is infinite, it has boundaries on the top and on the left.

In this problem, we are solving the problem that, given the actions of two players in a set of Infinite Go, find out the number of remaining stones of each player on the final board.

Input

The input begins with a line containing an integer T ($1 \leq T \leq 20$) — the number of test cases.

For each test case, the first line contains a single integer N ($1 \leq N \leq 10000$), the number of stones placed during this set. Then follows N lines, the i-th line contains two integers X and Y ($1 \leq X, Y \leq 2\,000\,000\,000$) — the i-th stone was put on row X and column Y. The stones are given in chronological order, and it is obvious that odd-numbered stones are black and even-numbered ones are white.

Output

For each test case, output two integers N_b and N_w in one line, separated by a single space. N_b is the number of black stones left on the board, while N_w is the number of white stones left on the board.

Example

standard input	standard output
1 7 5 5 4 5 3 5 3 4 4 4 3 3 4 6	4 2