Problem J
Jom and Terry

Recently, the mouse Terry has come to live in a cheese factory. Day after day, Terry has eaten a considerable amount of cheese that the factory has produced. With Terry's presence, the cheese supply has decreased significantly. Jom the cat has been tasked with guarding the cheese stock, preventing Terry from stealing any pieces of cheese. The first thing Jom did was to set traps at all positions where there was cheese. This caused a considerable hindrance to Terry's food-gathering process.

Not giving up, Terry devised a plan to safely eat the cheese inside the stockroom. After investigating the traps, Terry found there are n traps in the stockroom. Each trap has a special structure represented by a tube. At each end of the trap, Jom has placed one of two items:

- A piece of cheese with a positive mass.
- A special food glue that allows sticking together two pieces of cheese with masses x and y units, forming a new piece of cheese with a mass of $x + y$. Each glue can only be used once.

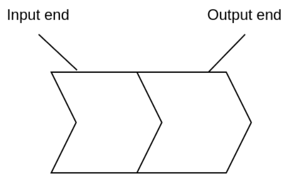


Figure J.1: Mouse trap

For each tube, Terry calls one of its end "the input end" and the other "the output end". Terry can cleverly move from "the input end" to "the output end" safely. However, moving in the opposite direction will trigger Jom's trap.

The following illustration is an example of traps placement by Jom the cat, with $n = 3$ traps:

- Trap 1 with a piece of cheese with mass 1 at the input end, and a glue at the output end.
- Trap 2 with a glue at the input end, and a piece of cheese with mass 2 at the output end.
- Trap 3 with a piece of cheese with mass 4 at the input end, and a piece of cheese with mass 3 at the output end.

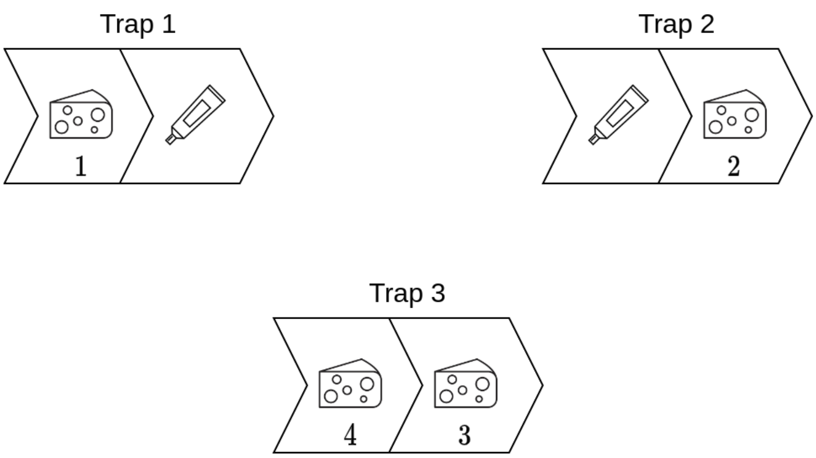


Figure J.2: An example of traps placement by Jom the cat.

With this information, Terry now has a plan. Terry has prepared a bag large enough to carry all the cheese in the stockroom. First, Terry will move to trap p_1, then to trap p_2, and so on, until trap p_n, where $p_1, p_2, \ldots, p_n$ is a permutation of integers from 1 to n that Terry will choose. When moving to trap i, Terry crawls into the trap, first picking up the item at the input end of the trap, moving through the trap, and then picking up the item at the output end.

- When Terry picks up a piece of cheese, Terry will put the cheese into the bag.
- When Terry picks up the food glue, Terry will take the **last** 2 pieces of cheese placed into the bag in the order they were added, stick them together using the glue, and put the newly combined cheese back into the bag. If there are fewer than two pieces of cheese remaining in the bag, Terry will throw away the glue.

The plan is nearly perfect, but Terry also needs an escape plan if Jom appears. Terry calculates that the time to move through all n traps is very fast. However, when returning to the burrow, due to carrying a very heavy bag, the travel time will be much longer. If Jom appears at that time, instinctively, Terry will take the **last** piece of cheese put into the bag, leave the bag with the remaining cheese, and quickly run back to the burrow. Of course, if there is no cheese in the bag, Terry will not take any cheese back to the burrow.

Given the description of items placed in n traps, help Terry find the sequence of movements $p_1, p_2, \ldots, p_n$ so that in case Terry has to escape from Jom, the mass of cheese Terry can take back to the burrow is as **large as possible**.

In the aforementioned example of trap placement, one possible plan to traverse the traps is $p = [3, 1, 2]$.

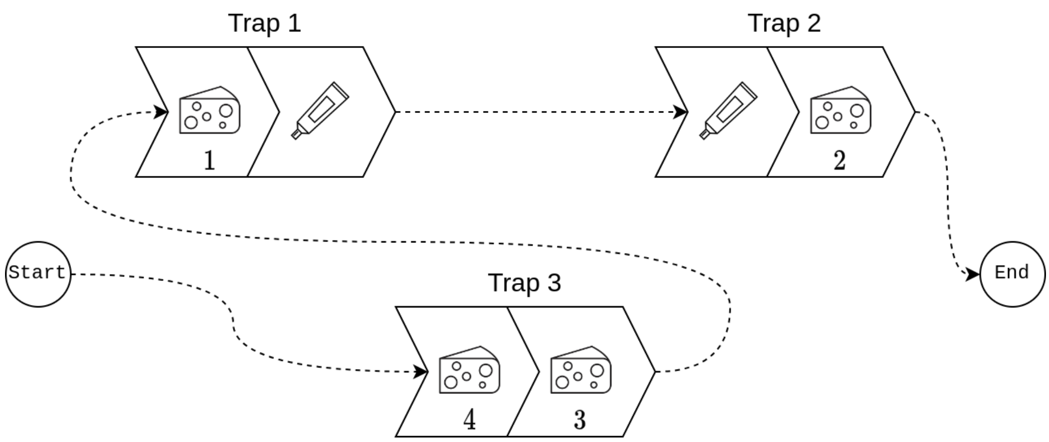
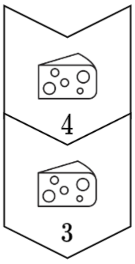
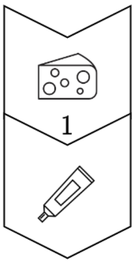
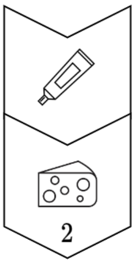


Figure J.3: A potential plan with the trap traversal order of $p = [3, 1, 2]$.

Following this plan and visiting all the traps, Terry's bag will contain pieces of cheese with masses of $[8, 2]$. The events and the corresponding state of Terry's cheese bag are explained as follows:

	Events	Terry's cheese bag
Enter Trap 3		
	Add a piece of cheese with mass of 4 to the bag.	$[4]$
	Add a piece of cheese with mass of 3 to the bag.	$[4, 3]$
Enter Trap 1		
	Add a piece of cheese with mass of 1 to the bag.	$[4, 3, 1]$
	Use the glue to attach the last two pieces of cheese. Obtain a new piece of cheese with a mass of $3 + 1 = 4$.	$[4, 4]$
Enter Trap 2		
	Use the glue to attach the last two pieces of cheese. Obtain a new piece of cheese with a mass of $4 + 4 = 8$.	$[8]$
	Add a piece of cheese with mass of 2 to the bag.	$[8, 2]$

However, if Jom appears, Terry will escape with only a piece of cheese with a mass of 2. A more advantageous plan would be $p = [2, 3, 1]$.

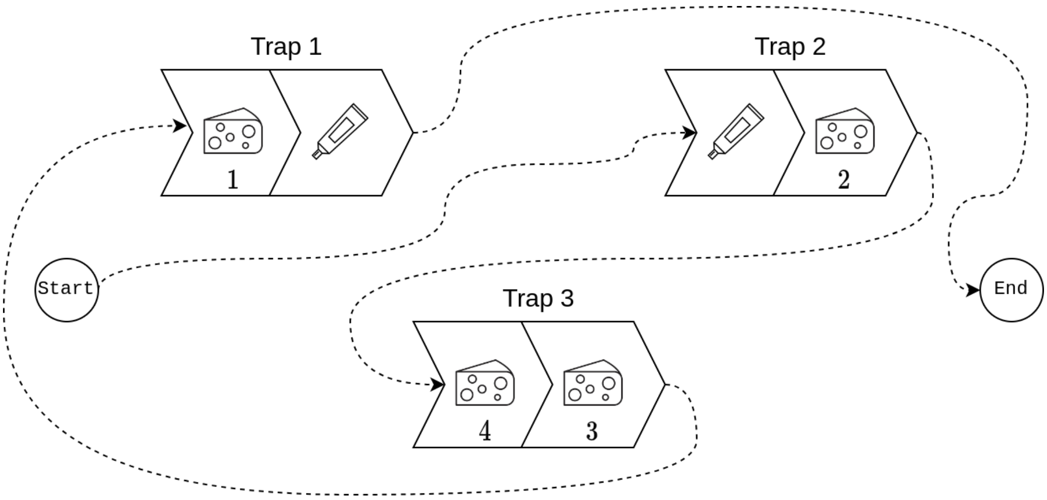
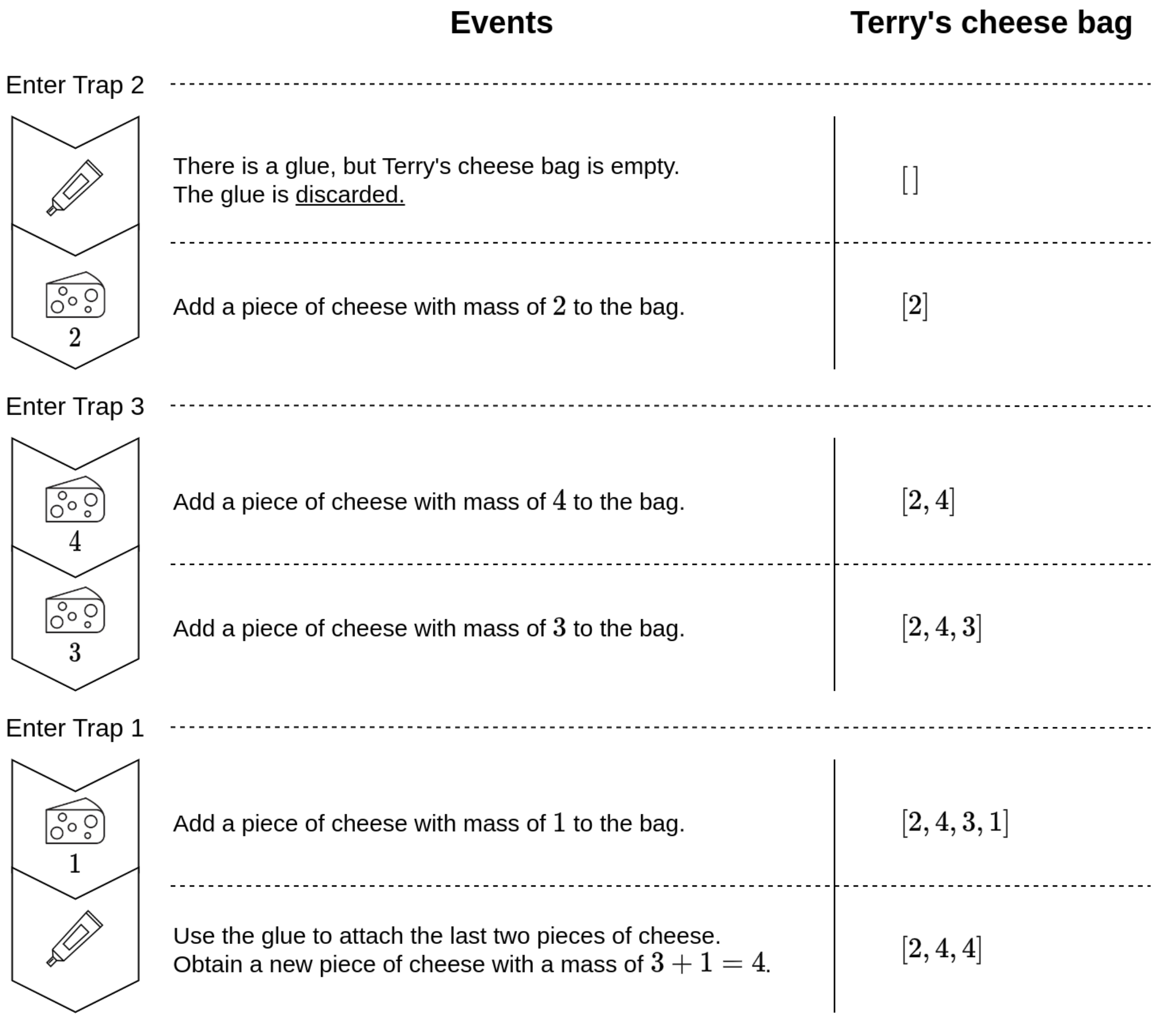


Figure J.4: An optimal plan with $p = [2, 3, 1]$.

Executing this plan would fill Terry's cheese bag with pieces of masses $[2, 4, 4]$ at the end. Thus, when Jom appears, Terry can escape with a piece weighing 4.



It can be proven that this is the optimal plan for the example.

Input

The input consists of multiple test cases. Each test case is presented as below:

- The first line contains a positive integer n ($1 \le n \le 2 \times 10^5$) – the number of traps that Jom has placed in the stockroom.

  In the next n lines, the i-th one contains two integers a_i and b_i ($0 \le a_i, b_i \le 10^9$) describing the two ends of the i-th trap as below:

  - If $a_i > 0$, the input end of the trap contains a piece of cheese with a positive mass of a_i.
  - If $a_i = 0$, the input end of the trap contains food glue.

The number b_i describes the output end of this trap in the same way.

The input is terminated by a line containing a single 0 which does not represent a test case.

It is guaranteed that the sum of n over all test cases does not exceed 2×10^5.

Output

For each test case, print n integers $p_1, p_2, \ldots, p_n$ representing the order of trap movements in Terry's plan so that if Terry has to flee from Jom after visiting all n traps, the mass of cheese Terry can take back to the burrow is **largest possible**.

If there are multiple optimal solutions, you can output any of them.

Sample Explanation

In the first test case, there are no food glues in the stock room. Hence, the last piece of cheese put into the bag is the one at the output end of the last visited trap. Therefore, by visiting the traps in the order $p = [2, 1]$, the last piece of cheese put into the bag has a mass of 3.

In the second test case, at the output end of the second trap, there is food glue. By choosing the visiting order $p = [1, 2]$, Terry can use that food glue and stick two pieces of cheese with a mass of 1 together to get a piece of cheese with a mass of 2.

In the third test case, if Terry chooses the order $p = [1, 2]$, the food glue at the input end of the second trap will be used to stick two pieces of cheese at the first trap together, but then Terry will have to leave a piece of cheese with a mass of 1 at the end, so it's better to choose the order $p = [2, 1]$, where the last piece of cheese put into Terry's bag has a mass of 2.

In the fourth test case, by moving in the order $p = [3, 1, 2]$, at the end Terry will put a piece of cheese with a mass of $4 + 4 + 4 = 12$ into the bag. Another sequence of movements yielding this final piece of cheese is $p = [1, 3, 2]$.

Sample Input 1	Sample Output 1
2 2 3 1 2 2 1 1 1 0 2 2 2 0 1 3 4 4 0 0 4 4 0	2 1 1 2 2 1 1 3 2