Problem B. Car Wash

Input file:	`carwash.in`
Output file:	`carwash.out`
Time limit:	2 seconds
Memory limit:	256 megabytes

Ben is the owner of a car wash. Ben offers car washing and dry-cleaning of the car compartment. His wash is located in the capital of Edgeland, and he often serves clients from government. Recently Ben has received an order of washing and dry-cleaning of n cars. And this order must be executed as fast as possible!

After preliminary investigation, Ben found out that the i-th car can be washed in a_i minutes and cleaned in b_i minutes. Washing and cleaning are performed at different buildings, so they cannot be performed simultaneously for the same car. The order of the two operations for a car is irrelevant, neither is the order of processing the cars. Ben's best workers Tom and Jerry were called to perform the order. Tom will wash the cars, and Jerry will dry-clean their compartments. Each worker can work with one car at a moment, and due to quality requirements, it is not allowed to switch from one car to another until the one is ready (this condition is independent for each worker, different workers can process cars in any order).

Help Ben to find out how the cars should be processed by the workers, so that all cars were finished as soon as possible.

Input

The first line of the input file contains n ($1 \le n \le 10\,000$). The following n lines contain two integer numbers each: a_i and b_i ($1 \le a_i, b_i \le 10^5$).

Output

The first line of the output file must contain t — the number of minutes after the process has started when all cars will be washed and dry-cleaned. You must minimize this number.

The following n lines must contain two integer numbers each — the number of minutes after the start of the process when the washing and the dry-cleaning of the corresponding car must start, respectively.

If there are several optimal solutions, output any one.

Example

carwash.in	carwash.out
6 10 6 7 9 3 8 1 2 12 7 6 6	39 11 26 4 17 0 7 3 15 27 0 21 32