C. Misha and Forest

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Let's define a forest as a non-directed acyclic graph (also without loops and parallel edges). One day Misha played with the forest consisting of n vertices. For each vertex v from 0 to n - 1 he wrote down two integers, $degree_v$ and s_v, were the first integer is the number of vertices adjacent to vertex v, and the second integer is the XOR sum of the numbers of vertices adjacent to v (if there were no adjacent vertices, he wrote down 0).

Next day Misha couldn't remember what graph he initially had. Misha has values $degree_v$ and s_v left, though. Help him find the number of edges and the edges of the initial graph. It is guaranteed that there exists a forest that corresponds to the numbers written by Misha.

Input

The first line contains integer n ($1 \le n \le 2^{16}$), the number of vertices in the graph.

The i-th of the next lines contains numbers $degree_i$ and s_i ($0 \le degree_i \le n$ - 1, $0 \le s_i < 2^{16}$), separated by a space.

Output

In the first line print number m, the number of edges of the graph.

Next print m lines, each containing two distinct numbers, a and b ($0 \le a \le n$ - 1, $0 \le b \le n$ - 1), corresponding to edge (a, b).

Edges can be printed in any order; vertices of the edge can also be printed in any order.

Examples

input
3 2 3 1 0 1 0
output
2 1 0 2 0

input
2 1 1 1 0
output
1 0 1

Note

The XOR sum of numbers is the result of bitwise adding numbers modulo 2. This operation exists in many modern programming languages. For example, in languages C++, Java and Python it is represented as "^", and in Pascal — as "xor".