A. 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 ($1 \leq n \leq 2^{16}$), the number of vertices in the graph.

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

Copy

```
3
2 3
1 0
1 0
```

output

Copy

```
2
1 0
2 0
```

input

Copy

```
2
1 1
1 0
```

output

Copy

```
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".