1000. Huffman coding

Total: 323 Accepted: 73

Time Limit: 1sec Memory Limit:256MB

Description

In computer science and information theory, a Huffman code is an optimal prefix code algorithm.

In this exercise, please use Huffman coding to encode a given data.

You should output the number of bits, denoted as $B(T)$, to encode the data:

$B(T)=\sum f(c)d_T(c)$,

where $f(c)$ is the frequency of character c, and $d_T(c)$ is be the depth of character c's leaf in the tree T.

Input

The first line is the number of characters n.

The following n lines, each line gives the character c and its frequency $f(c)$.

Output

Output a single number $B(T)$.

Sample Input

Copy

```
5
0 5
1 4
2 6
3 2
4 3
```

Sample Output

Copy

```
45
```

Hint

0: 01
1: 00
2: 11
3: 100
4: 101

Problem Source: Exercise 2

Submit