Problem A. Sereja and Dima

Time limit	1000 ms
Mem limit	262144 kB
Input file	stdin
Output file	stdout

Sereja and Dima play a game. The rules of the game are very simple. The players have n cards in a row. Each card contains a number, all numbers on the cards are distinct. The players take turns, Sereja moves first. During his turn a player can take one card: either the leftmost card in a row, or the rightmost one. The game ends when there is no more cards. The player who has the maximum sum of numbers on his cards by the end of the game, wins.

Sereja and Dima are being greedy. Each of them chooses the card with the larger number during his move.

Inna is a friend of Sereja and Dima. She knows which strategy the guys are using, so she wants to determine the final score, given the initial state of the game. Help her.

Input

The first line contains integer n $(1 \le n \le 1000)$ — the number of cards on the table. The second line contains space-separated numbers on the cards from left to right. The numbers on the cards are distinct integers from 1 to 1000.

Output

On a single line, print two integers. The first number is the number of Sereja's points at the end of the game, the second number is the number of Dima's points at the end of the game.

Examples

Input	Output
4 4 1 2 10	12 5

Input	Output
7 1 2 3 4 5 6 7	16 12

Note

In the first sample Sereja will take cards with numbers 10 and 2, so Sereja's sum is 12. Dima will take cards with numbers 4 and 1, so Dima's sum is 5.

Problem B. Indian Summer

Time limit	2000 ms
Mem limit	262144 kB
Input file	stdin
Output file	stdout

Indian summer is such a beautiful time of the year! A girl named Alyona is walking in the forest and picking a bouquet from fallen leaves. Alyona is very choosy — she doesn't take a leaf if it matches the color and the species of the tree of one of the leaves she already has. Find out how many leaves Alyona has picked.

Input

The first line contains an integer n ($1 \le n \le 100$) — the number of leaves Alyona has found. The next n lines contain the leaves' descriptions. Each leaf is characterized by the species of the tree it has fallen from and by the color. The species of the trees and colors are given in names, consisting of no more than 10 lowercase Latin letters. A name can not be an empty string. The species of a tree and the color are given in each line separated by a space.

Output

Output the single number — the number of Alyona's leaves.

Examples

Input	Output
5 birch yellow maple red birch yellow maple yellow maple green	4

Input	Output
3 oak yellow oak yellow oak yellow	1

Problem C. Regular Bracket Sequence

Time limit	5000 ms
Mem limit	262144 kB
Input file	stdin
Output file	stdout

A bracket sequence is called regular if it is possible to obtain correct arithmetic expression by inserting characters «+» and «1» into this sequence. For example, sequences «(())()», «()» and «(()(()))» are regular, while «)(», «(()» and «(())(» are not.

One day Johnny got bracket sequence. He decided to remove some of the brackets from it in order to obtain a regular bracket sequence. What is the maximum length of a regular bracket sequence which can be obtained?

Input

Input consists of a single line with non-empty string of «(» and «)» characters. Its length does not exceed 10^6.

Output

Output the maximum possible length of a regular bracket sequence.

Examples

Input	Output
(())((	4

Input	Output
((()()))	6

Problem D. Games

Time limit	1000 ms
Mem limit	262144 kB
Input file	stdin
Output file	stdout

Manao works on a sports TV. He's spent much time watching the football games of some country. After a while he began to notice different patterns. For example, each team has two sets of uniforms: home uniform and guest uniform. When a team plays a game at home, the players put on the home uniform. When a team plays as a guest on somebody else's stadium, the players put on the guest uniform. The only exception to that rule is: when the home uniform color of the host team matches the guests' uniform, the host team puts on its guest uniform as well. For each team the color of the home and guest uniform is different.

There are n teams taking part in the national championship. The championship consists of $n \cdot (n - 1)$ games: each team invites each other team to its stadium. At this point Manao wondered: how many times during the championship is a host team going to put on the guest uniform? Note that the order of the games does not affect this number.

You know the colors of the home and guest uniform for each team. For simplicity, the colors are numbered by integers in such a way that no two distinct colors have the same number. Help Manao find the answer to his question.

Input

The first line contains an integer n ($2 \le n \le 30$). Each of the following n lines contains a pair of distinct space-separated integers h_i, a_i ($1 \le h_i, a_i \le 100$) — the colors of the i-th team's home and guest uniforms, respectively.

Output

In a single line print the number of games where the host team is going to play in the guest uniform.

Examples

Input	Output
3 1 2 2 4 3 4	1

Input	Output
4 100 42 42 100 5 42 100 5	5

Input	Output
2 1 2 1 2	0

Note

In the first test case the championship consists of 6 games. The only game with the event in question is the game between teams 2 and 1 on the stadium of team 2.

In the second test sample the host team will have to wear guest uniform in the games between teams: 1 and 2, 2 and 1, 2 and 3, 3 and 4, 4 and 2 (the host team is written first).

Problem E. Queue

Time limit 1000 ms
Mem limit 262144 kB

Little girl Susie went shopping with her mom and she wondered how to improve service quality.

There are n people in the queue. For each person we know time t_i needed to serve him. A person will be disappointed if the time he waits is more than the time needed to serve him. The time a person waits is the total time when all the people who stand in the queue in front of him are served. Susie thought that if we swap some people in the queue, then we can decrease the number of people who are disappointed.

Help Susie find out what is the maximum number of not disappointed people can be achieved by swapping people in the queue.

Input

The first line contains integer n ($1 \le n \le 10^5$).

The next line contains n integers t_i ($1 \le t_i \le 10^9$), separated by spaces.

Output

Print a single number — the maximum number of not disappointed people in the queue.

Examples

Input	Output
5 15 2 1 5 3	4

Note

Value 4 is achieved at such an arrangement, for example: $1, 2, 3, 5, 15$. Thus, you can make

everything feel not disappointed except for the person with time 5.

Problem F. Rank List

Time limit	2000 ms
Mem limit	262144 kB
Input file	stdin
Output file	stdout

Another programming contest is over. You got hold of the contest's final results table. The table has the following data. For each team we are shown two numbers: the number of problems and the total penalty time. However, for no team we are shown its final place.

You know the rules of comparing the results of two given teams very well. Let's say that team a solved p_a problems with total penalty time t_a and team b solved p_b problems with total penalty time t_b. Team a gets a higher place than team b in the end, if it either solved more problems on the contest, or solved the same number of problems but in less total time. In other words, team a gets a higher place than team b in the final results' table if either $p_a > p_b$, or $p_a = p_b$ and $t_a < t_b$.

It is considered that the teams that solve the same number of problems with the same penalty time share all corresponding places. More formally, let's say there is a group of x teams that solved the same number of problems with the same penalty time. Let's also say that y teams performed better than the teams from this group. In this case all teams from the group share places $y + 1, y + 2, \ldots, y + x$. The teams that performed worse than the teams from this group, get their places in the results table starting from the $y + x + 1$-th place.

Your task is to count what number of teams from the given list shared the k-th place.

Input

The first line contains two integers n and k ($1 \le k \le n \le 50$). Then n lines contain the description of the teams: the i-th line contains two integers p_i and t_i ($1 \le p_i, t_i \le 50$) — the number of solved problems and the total penalty time of the i-th team, correspondingly. All numbers in the lines are separated by spaces.

Output

In the only line print the sought number of teams that got the k-th place in the final results' table.

Examples

Input	Output
7 2 4 10 4 10 4 10 3 20 2 1 2 1 1 10	3

Input	Output
5 4 3 1 3 1 5 3 3 1 3 1	4

Note

The final results' table for the first sample is:

- 1-3 places — 4 solved problems, the penalty time equals 10
- 4 place — 3 solved problems, the penalty time equals 20
- 5-6 places — 2 solved problems, the penalty time equals 1
- 7 place — 1 solved problem, the penalty time equals 10

The table shows that the second place is shared by the teams that solved 4 problems with penalty time 10. There are 3 such teams.

The final table for the second sample is:

- 1 place — 5 solved problems, the penalty time equals 3
- 2-5 places — 3 solved problems, the penalty time equals 1

The table shows that the fourth place is shared by the teams that solved 3 problems with penalty time 1. There are 4 such teams.

Problem G. Sereja and Brackets

Time limit	1000 ms
Mem limit	262144 kB
Input file	stdin
Output file	stdout

Sereja has a bracket sequence $s_1, s_2, \ldots, s_n$, or, in other words, a string s of length n, consisting of characters "(" and ")".

Sereja needs to answer m queries, each of them is described by two integers l_i, r_i $(1 \le l_i \le r_i \le n)$. The answer to the i-th query is the length of the maximum correct bracket subsequence of sequence $s_{l_i}, s_{l_i+1}, \ldots, s_{r_i}$. Help Sereja answer all queries.

You can find the definitions for a subsequence and a correct bracket sequence in the notes.

Input

The first line contains a sequence of characters $s_1, s_2, \ldots, s_n$ $(1 \le n \le 10^6)$ without any spaces. Each character is either a "(" or a ")". The second line contains integer m $(1 \le m \le 10^5)$ — the number of queries. Each of the next m lines contains a pair of integers. The i-th line contains integers l_i, r_i $(1 \le l_i \le r_i \le n)$ — the description of the i-th query.

Output

Print the answer to each question on a single line. Print the answers in the order they go in the input.

Examples

Input	Output
())(())(())(7 1 1 2 3 1 2 1 12 8 12 5 11 2 10	0 0 2 10 4 6 6

Note

A *subsequence* of length $|x|$ of string $s = s_1 s_2 \dots s_{|s|}$ (where $|s|$ is the length of string s) is string $x = s_{k_1} s_{k_2} \dots s_{k_{|x|}}$ ($1 \le k_1 < k_2 < \dots < k_{|x|} \le |s|$).

A *correct bracket sequence* is a bracket sequence that can be transformed into a correct aryphmetic expression by inserting characters "1" and "+" between the characters of the string. For example, bracket sequences "()()", "(())" are correct (the resulting expressions "(1)+(1)", "((1+1)+1)"), and ")(" and "(" are not.

For the third query required sequence will be «()».

For the fourth query required sequence will be «()(())(())».

Problem H. Journey

Time limit 2000 ms
Mem limit 262144 kB

There are n cities and n - 1 roads in the Seven Kingdoms, each road connects two cities and we can reach any city from any other by the roads.

Theon and Yara Greyjoy are on a horse in the first city, they are starting traveling through the roads. But the weather is foggy, so they can’t see where the horse brings them. When the horse reaches a city (including the first one), it goes to one of the cities connected to the current city. But it is a strange horse, it only goes to cities in which they weren't before. In each such city, the horse goes with equal probabilities and it stops when there are no such cities.

Let the length of each road be 1. The journey starts in the city 1. What is the expected length (expected value of length) of their journey? You can read about expected (average) value by the link https://en.wikipedia.org/wiki/Expected_value.

Input

The first line contains a single integer n ($1 \le n \le 100000$) — number of cities.

Then n - 1 lines follow. The i-th line of these lines contains two integers u_i and v_i ($1 \le u_i, v_i \le n, u_i \ne v_i$) — the cities connected by the i-th road.

It is guaranteed that one can reach any city from any other by the roads.

Output

Print a number — the expected length of their journey. The journey starts in the city 1.

Your answer will be considered correct if its absolute or relative error does not exceed 10^{-6}.

Namely: let's assume that your answer is a, and the answer of the jury is b. The checker program will consider your answer correct, if $\frac{|a-b|}{max(1,b)} \le 10^{-6}$.

Examples

Input	Output
4 1 2 1 3 2 4	1.500000000000000

Input	Output
5 1 2 1 3 3 4 2 5	2.000000000000000

Note

In the first sample, their journey may end in cities 3 or 4 with equal probability. The distance to city 3 is 1 and to city 4 is 2, so the expected length is 1.5.

In the second sample, their journey may end in city 4 or 5. The distance to the both cities is 2, so the expected length is 2.

Problem I. Restaurant

Time limit 4000 ms
Mem limit 262144 kB

A restaurant received n orders for the rental. Each rental order reserve the restaurant for a continuous period of time, the i-th order is characterized by two time values — the start time l_i and the finish time r_i ($l_i \le r_i$).

Restaurant management can accept and reject orders. What is the maximal number of orders the restaurant can accept?

No two accepted orders can intersect, i.e. they can't share even a moment of time. If one order ends in the moment other starts, they can't be accepted both.

Input

The first line contains integer number n ($1 \le n \le 5 \cdot 10^5$) — number of orders. The following n lines contain integer values l_i and r_i each ($1 \le l_i \le r_i \le 10^9$).

Output

Print the maximal number of orders that can be accepted.

Examples

Input	Output
2 7 11 4 7	1

Input	Output
5 1 2 2 3 3 4 4 5 5 6	3

Input	Output
6 4 8 1 5 4 7 2 5 1 3 6 8	2