2sum

Problem ID: 2sum

Your spaceship is running out of energy. To fill it up, you need to use a special kind of energy slot. There are n energy slots in total and each of them has a number. If a pair of them add up to a power of two, you get one unit of energy. An energy slot is allowed to be used in different pairs. How much energy can you generate from your energy slots?

Input

The input consists of:

- One line with one integer n ($1 \leq n \leq 5 * 10^5$), where n is the number of energy slots.
- One line with n integers a_i ($1 \leq a_i \leq 10^9$), where a_i is the number on the i-th energy slot.

Output

Output the total number energy units you can get.

Sample Input 1	Sample Output 1
4 2 2 2 2	6

Sample Input 2	Sample Output 2
4 2 6 14 26	3

balloon
Problem ID: balloon

On Mercury, people eat balloons instead of donuts. You want to try n dozen balloons.

Input

The input consists of:

- One line with one integer n ($1 \leq n \leq 100$), where n is the number of dozen balloons you want to try.

Output

Output "I want x balloons", where x is the exact number of balloons.

Sample Input 1	Sample Output 1
1	I want 12 balloons

Sample Input 2	Sample Output 2
6	I want 72 balloons

chain
Problem ID: chain

You are in Farming City located on the planet Tree. Each city has a beauty number and you can travel from Farming City to any other city. Your satisfaction is defined as the product of the beauty numbers of all cities along the path from Farming City to the destination city, including Farming City and your destination. What is the maximum amount of satisfaction you can obtain?

The people on planet Tree hate cutting down trees to build roads. Because of this, they have only created the minimum number of roads to connect their cities. If there are n cities, there are exactly $n - 1$ roads.

Input

The input consists of:

- One line with one integer n ($1 \leq n \leq 10^5$), where n is the number of cities. Farming City is number 0.
- One line with n integers, a_i ($-4 \leq a_i \leq 4$), where a_i is the beauty score of the i-th city.
- $n - 1$ lines with two integers u, v ($0 \leq u, v < n$), means that there is a road between u and v.

Output

Output the maximum satisfaction you can achieve. The answer won't exceed 10^{18}.

Sample Input 1

```
3
1 2 4
0 1
1 2
```

Sample Output 1

```
8
```

Sample Input 2

```
4
1 4 -4 -2
0 1
0 2
2 3
```

Sample Output 2

```
8
```

eggs

Problem ID: eggs

Your alien friend, Yiddle, is hungry. He really wants to eat some eggs, so you decide to take a trip to the nearest market. The market happens to be having a sale: you can take up to k eggs and only pay for the cheapest one. Since Yiddle is a growing child, you also want to maximize his protein intake.

The total value of the eggs you choose is defined as the sum of their protein content times the minimum of all of their prices (since you only pay for the cheapest one). What is the maximum total value you can get?

Input

The input consists of:

- One line with two integers n, and k($1 \leq n \leq 10^5$, $1 \leq k \leq n$), where n is the number of eggs and k is the maximum number of eggs you can choose.
- n lines with two integers x_i, y_i ($1 \leq x_i, y_i \leq 10^6$), where x_i is the protein content and y_i is the price of the i-th egg.

Output

Output the maximum total value.

Sample Input 1

```
3 2
1 9
4 2
3 7
```

Sample Output 1

```
28
```

Sample Input 2

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

Sample Output 2

```
9
```

game

Problem ID: game

Akatsuki is tired of the games between Alice and Bob, but on another planet, he notices that there are two different people, Aob and Blice, who play games with each other. Akatsuki wants to help Aob to win the game because they have the same initial.

The game is split into a series of n rounds, each of which can be won by Aob or Blice. Fortunately, Akatsuki can see the future and predict who will win each round. He can also intefere with some specfic rounds and ensure that Aob wins that round. However, he does not want Blice to catch on and only wants to change the minimum number of rounds that would result in Aob winning the game. A player wins the game if they have won more rounds that their opponent.

Input

The input consists of:

- One line with one integer n ($1 \leq n \leq 100$), where n is the number of rounds.
- One line with n characters, either A or B. If the i-th character is A, it means Aob will win the i-th round without Akatsuki's help. Otherwise it means that Blice will win the i-th round.

Output

Output the minimum number of rounds that Akatsuki needs to help Aob in order to ensure his victory over Blice.

Sample Input 1	Sample Output 1
5 AABBA	0

Sample Input 2	Sample Output 2
7 ABABBBB	2

grade

Problem ID: grade

You need to take some exams to learn how to control a spaceship. You already took n of them and you only have one left now. To get access to the spaceship, your average score must be at least a given score. What is the minimum score you need to get in the last exam? Output -1 if it's impossible to reach the given score. The range of scores are from 0 to 100.

Input

The input consists of:

- One line with two integers n and k ($1 \leq n \leq 100$, $0 \leq k \leq 100$), where n is the number of exams you have taken, k is the average score you need to reach.
- One line with n integers, $g_1, \ldots g_n$ ($0 \leq g_i \leq 100$), the scores of the previous exams.

Output

Output the minimum score you need to get in the next exam, or output -1 if it's impossible to reach the given average score.

Sample Input 1	Sample Output 1
5 85 81 82 83 84 85	95

Sample Input 2	Sample Output 2
5 90 81 82 83 84 85	-1

hill

Problem ID: hill

There are n hills in a row on the moon with different height. Your lucky number is k, so you want to maximize the number of hills with height k. Fortunately, you have access to a top-secret Death Star replica created by the NSA. It is only a small-scale replica and can only raise or lower a continous subsegment of the hills with the same height (by firing its laser or using its tractor beams). It also only can perform one operation per day before it runs out of energy.

If you raise/lower the hills optimally, how many hills of height k can you get by the end of the day? Note that a hill can be of negative height after the operation (indented in the ground).

Input

The input consists of:

- One line with two integers n and k ($1 \leq n, k \leq 10^5$), where n is the number of hills, k is your lucky number.
- One line with n integers h_i ($1 \leq h_i \leq 10^5$), where h_i is the height of the i-th hill.

Output

Output the number of hills that are of height k by the end of the day if you raise/lower optimally.

Sample Input 1	Sample Output 1
3 2 3 2 3	2

Sample Input 2	Sample Output 2
5 2 2 6 2 2 5	4

stars
Problem ID: stars

You are an astronaut and going to start a journey in a 2D space! You know that there are n stars in the sky, and at least $\lceil \frac{n}{10} \rceil$ of them are on the same line. Find the slope of the line.

Input

The input consists of:

- One line with one integer n ($1 \leq n \leq 5 * 10^5$), where n is the number of stars in the sky.
- n lines with two integers x, y ($-10^9 \leq x, y \leq 10^9$), the coordinate of each star.

Output

Output the slope of the line with at least $\lceil \frac{n}{10} \rceil$ stars on it, with the format $dx\ dy$, you need to make sure $gcd(dx, dy) == 1$ and $dx \geq 0$. It's guaranteed that the answer is unique.

Sample Input 1	Sample Output 1
2 0 0 1 1	1 1

Sample Input 2	Sample Output 2
2 1 4 2 4	1 0

translate
Problem ID: translate

You are part of Elon Musk's first Mars adventure. You travel to Mars and find that the people there are using a different language that you don't know. However, your friend, Ji Hwan, notices that they use the same alphabet, but in a different order. After some experimentation, he has managed to figure out which English characters corresponds to which Martian character. Given this knowledge, can you translate all the given sentences?

Input

The input consists of:

- One line with one integer n ($1 \leq n \leq 100$), where n is the number of sentences.
- One line, ℓ, with 26 lowercase letters. The i-th letter of of the English alphabet corresponds to the i-th letter of ℓ. For example, if the first character of ℓ is "x", then the English character "a" corresponds to the Martian letter "x". Note that all letters are lowercase characters.
- n lines of sentences you need to translate from English to Martian.

Output

Output the translated sentences.

Sample Input 1	Sample Output 1
3 badcfehgjilknmporqtsvuxwzy abcd aaabbb ucrpc	badc bbbaaa vdqod

tree

Problem ID: tree

Akatsuki is building roads on a new planet to connect all of the cities together. His goal is to minimize the total distance between each city. He has chosen some of them to build. However, you want to play a prank on him and remove an road chosen by him, but make the increments as few as possible. Note that it is guaranteed that Akatsuki's plan is unique.

If you remove exactly one road optimally (to increase the minimum distance as few as possible), what will be the new minimum distance to connect all the cities?

Note that you are not allowed to remove roads that would result in a city becoming unreachable.

Input

The input consists of:

- One line with two integers n and m ($3 \leq n \leq 10^4$, $n \leq m \leq 10^4$), where n is the number of cities, and m is the number of optional roads.
- m lines with u, v, and w ($0 \leq u, v < n$, $1 \leq w \leq 10^5$), means there is a bidirectional road between u and v with distance w.

Output

Output the new minimum distance to connect all cities if you remove one road optimally.

Sample Input 1

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

Sample Output 1

```
4
```

Sample Input 2

```
4 4
1 2 1
1 3 2
2 4 3
3 4 4
```

Sample Output 2

```
7
```