Problem A. whatever

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Do you have what it takes to solve this problem? Print `"whatever it takes"` on a single line to standard output.

Input

There is no input for this problem.

Output

A single line containing the string `"whatever it takes"` without any trailing spaces or the surrounding quotes.

Problem B. thor

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Thor is trying to rebuild Asgard after it was destroyed by Surtur in Ragnarok. He's currently trying to figure how he might be able to package all of his supplies for storage. He's already managed to box all of his things into cubes with side length a. He wants to know how many of these boxes he can fit into one of his storage rooms. His storage room is a cube of side length b. Thor needs your help!

Input

The only line of input contains two space-separated integers a and b ($1 \le a, b \le 1000$), the side length of one of Thor's boxes and his storage room respectively.

Output

Output one integer, the number of boxes he can fit in the storage room.

Examples

standard input	standard output
1 10	1000
2 4	8

Problem C. assemble

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

The Avengers are trying to track down Thanos to get revenge after he erased half of all life! In order to do so, they need to intercept messages being sent between planets in the universe. For their decoding algorithm to work, they need your help to provide vital information. For the stolen message, they need to find the most and least frequent substrings. A substring is defined to be a group of contiguous letters in a string.

Input

The only line of input is the stolen message in the form of a string consisting of lowercase letters in the English alphabet. The length of the string is at most 10^5.

Output

On two separate lines, output the most frequent and least frequent substring respectively. If there is more than one correct answer, output any of them.

Examples

standard input	standard output
abcabc	abc abca
endgamenglish	en lish

Problem D. scarletwitch

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Scarlet Witch is trying to rearrange barricades on a road, so that the Avengers can pass through. She wants to move all of the barricades to one side, but she can only move the barricades a certain way.

The barricades on the road are represented as a binary string, where a '1' represents a barricade and a '0' represents an empty space. She is allowed to perform operations where an operation is defined as reversing any substring in the string. What is the minimum number of operations she needs to sort the string (every '0' is to the left of every '1' in the string)?

Input

The first line of input contains a single integer n $(1 \leq n \leq 2 \cdot 10^5)$, the length of the string.

The second line of input contains a string of length n, where each character of the string is either 0 or 1.

Output

Output a single integer, the minimum number of operations needed to sort the string.

Examples

standard input	standard output
3 101	1
7 1001101	2

Note

In the first sample, the Scarlet Witch can reverse the substring formed by the first two characters to form the string "011".

In the second sample, the Scarlet Witch can first reverse the substring formed by the first three characters to form the string "0011101". Then she can reverse the substring "1110" to get the string "0001111".

Problem E. groot

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Now that Groot is back in his teenage years he's addicted to video games. Thus, his biggest problem is not fighting Thanos but fixing his current game that is broken.

His toy robot moves on the 2D plane. Coordinates are given with x increasing to the east and y increasing to the north. The robot begins at position $(0, 0)$ facing north and responds to the following four commands:

- 'F': Move forward by one unit.

- 'B': Move backward by one unit.

- 'L': Turn 90 degrees counter-clockwise.

- 'R': Turn 90 degrees clockwise.

Groot sent a list of n instructions to the robot, which executes them in order. However, the robot doesn't seem to execute exactly the instructions he wanted. He thinks he might have made an error when sending the instructions, but he doesn't think he's made more than one error. Fortunately, the robot has stopped moving and he can observe the final position of the robot. Can you help Groot determine the error he's made?

Input

The first line contains three space-separated integers n, x, y and one uppercase character D separated by a single space. n $(1 \le n \le 1,000)$ is the number of instructions sent, (x, y) represents the final position of the robot, and D is its final orientation, where D is either 'N' (north), 'S' (south), 'E' (east) or 'W' (west). You are guaranteed that $-n \le x, y \le n$.

The second line contains n uppercase characters $c_1, \ldots, c_n$ where c_i is the ith command you think you've sent the robot (either 'F', 'B', 'L', or 'R').

Output

If it is possible that no error has been made, print 0 on a single line. If it is not possible to reach the given configuration with a change to a single command, print -1 on a single line.

Otherwise, print i and c on one line, such that if you change c_i to command c, the robot will end up in the given configuration. If there are multiple possible changes, print the one with the smallest i.

Examples

standard input	standard output
4 0 3 W FFFF	4 L
4 0 4 N FFFF	0
4 0 2 N FFFF	1 B
4 0 -1 S FFFF	-1

Note

In the first sample, if Groot changes the fourth command to 'L', the sequence of commands becomes "FFFL". Following this sequence causes the robot to end at $(0, 3)$ and facing west.

In the second sample, Groot does not need to make any changes to the command sequence.

In the fourth sample, there is no way Groot can change at most one command so that the robot ends at $(0, -1)$ facing south.

Problem F. hawkeye

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Hawkeye needs to calibrate his bow and arrows for the upcoming battle with Thanos. His calibration device works as follows.

The device takes in a list of n integers. It then compresses this list down to one number by repeatedly applying a special summation operator S. This operator takes in two integers a and b and outputs $S(a, b) = a + b$. The output of this operator is then put back into the list. This process repeats until the list contains a single number.

However, this operator takes $a + b$ seconds to produce the output. Thus, Hawkeye wants to make this training as fast as possible. Output the minimum time it takes to compress this list into one number.

Input

The first line contains a single integer n ($1 \leq n \leq 1000$), the number of integers in the list.

The second line contains n space-separated integers $a_1, a_2, ..., a_n$ ($-1000 \leq a_i \leq 1000$), the numbers in our list.

Output

Print a single integer, the minimum time necessary to calculate the sum of all numbers in the list (time can be negative).

Examples

standard input	standard output
1 5	0
4 8 15 1 4	46

Note

In the first sample, we already have one number, so no training time is needed.

In the second sample, we can first apply $S(1, 4) = 5$ to obtain the list $8, 15, 5$ in 5 seconds. Then we can apply $S(8, 5) = 13$ to obtain the list $13, 15$, spending 13 seconds. Finally, we combine the remaining two numbers in 28 seconds. The total time for compressing the whole list is $5 + 13 + 28 = 46$ seconds.

Problem G. blackpanther

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

The sky is falling down, and it is up to the Avengers to save the world! Black Panther has a special calculator that his genius sister, Shuri, invented which can generate a shield to protect Stanford University. The number entered into the calculator is the strength of the shield, so Black Panther wants to enter the largest number possible!

However there is a catch. Black Panther, not being as great at math as Shuri, only knows a few numbers and can only use these numbers on his calculator. Also, the calculator can only perform arithmetic operations $+, -, *, /, =$ operations from left to right. (This means that PEMDAS is ignored.)

For example: If there is a sequence of $a + b * c - d$, the result should be computed as $((a + b) * (c)) - d$.

Black Panther must enter exactly n numbers into the calculator and cannot use the same number more than once.

Given the list of n numbers Black Panther knows, and the pre-set order of n operations the calculator will do, tell Black Panther the strength of the strongest shield he can make.

Input

The first line of input consists of integer n ($1 \leq n \leq 9$), the length of Black Panther's list of numbers.

The second line is a space-separated list of n numbers that Black Panther knows. Each number is between -1000 and 1000 inclusive. It is guaranteed that 0 does not appear in the list.

The last line is the space-separated list of n operations the calculator will do in order. Each operation is either a '+', '-', '*', '/', or '='. The last operation is always an '=' (that evaluates the preceding expression), and no other operations will be an '='.

Output

Output the maximum number that can be formed from this arrangement, rounded to 6 decimal places. Your solution will be considered correct if the absolute or relative error is less than 10^{-6}. It is guaranteed an answer exists.

Examples

standard input	standard output
2 2 2 + =	4
3 -1 3 4 * - =	13

Note

In the second sample, the optimal ordering is 4, 3, -1 since $((4*3) - (-1)) = 13$.

Problem H. thanos

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Thanos has been watching a solar system while waiting for his next strike. The solar system has one star at the center with n planets orbiting around it in concentric rings. The ith planet has a period t_i which is how many days it takes for the planet to make one whole revolution.

When all the planets line up, Thanos has extra super strength. In fact, they're all lined up right now! But he doesn't have the Infinity Gauntlet, so he can't attack yet. He wants you, Ebony Maw, head of the Black Order, to calculate how much time he has to get the Infinity Gauntlet before the next time all the planets line up! If you don't do this job, Thanos may "fire" you. Good luck!

Input

The first line contains one integer n $(2 \leq n \leq 10)$.

The second line contains n space-separated integers, where the ith integer is t_i. All t_i are distinct integers from 1 to 100.

Output

Print one line containing two space-separated integers a and b indicating that the next time all the planets will line up is in $\frac{a}{b}$ days (express the fraction in simplest terms, i.e. a and b should be relatively prime). It is guaranteed that a and b will be smaller than 10^9.

Examples

standard input	standard output
3 1 2 3	6 1
2 15 24	40 1
3 1 3 5	15 2