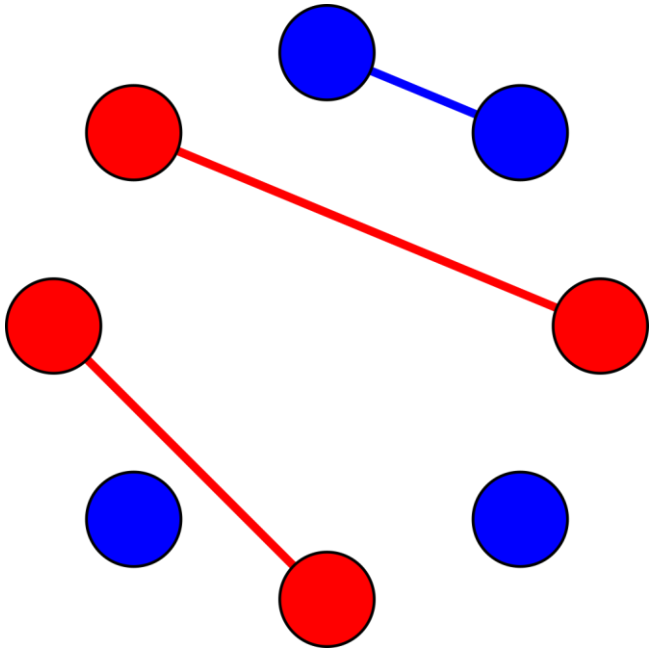
Problem A: Don't Cross the Beams

Filename: `beams`
Timelimit: `2 seconds`

Lasers are great fun! That is why you have setup a configuration of posts placed in a circular configuration with equal spacing. On each post you will place either a laser or a mirror box to receiver the laser beam!

You haven't quite figured out a configuration that looks nice but you do know for each post if you want it to send or receive laser beams of the two types of colors available (red or blue). You also don't want any of the beams to cross in your laser display.

Now you want to know the maximum number of lasers you can have in your design given a starting configuration of red and blue posts. Below is an example of posts and lasers being sent between them. Note that lasers travel in a straight line from their source to their mirror box.



Input

The input is a single string, ***s*** ($1 \le |s| \le 10^5$), of the characters 'R' or 'B', representing blue or red posts if you walked around the circle starting at an arbitrary post.

Output

Output a single integer on a line by itself representing the number of posts you can pair of the same color and not cross the laser beams!

Samples

Input	Output
RRRR	2
BBRBBRBRB	4
BRBRB	2
BBBRRRBBBRRR	5

Problem B: Excellence

Filename: `excellence`
Time limit: `2 seconds`

The World Coding Federation is setting up a huge online programming tournament of teams comprised of pairs of programmers. Judge David is in charge of putting teams together from the South Eastern delegation. Luckily, he has an even number of students who desire to compete, so that he can make sure that each student does compete. However, he'd like to maintain his pristine reputation amongst other judges by making sure that each of the teams he fields for the competition meet some minimum total rating. We define the total rating of a team to be the sums of the ratings of both individuals on the team. Help David determine the maximal value, X, such that he can form teams, each of which have a total rating greater than or equal to X. Note that every student must be placed on exactly one team of two students.

Input

Each input will consist of a single test case. Note that your program may be run multiple times on different inputs. The first line of each test case will be a positive even integer, n ($n \leq 10^5$), representing the number of students who desire to enter the online programming tournament. The following n lines will contain one single integer, s_i ($1 \leq s_i \leq 10^6$), each, representing the rating of student i.

Output

Output a single integer on a line by itself representing the maximal value, x, such that David can form teams where every team has a total rating greater than or equal to x.

Samples

Input	Output
4 1 2 3 5	5
2 18 16	34
4 13 12 19 14	27

Problem C: Sorting K Window Sums

Filename: `ksums`

Time limit: `2 seconds`

Given a sequence of ***n*** integers, we define a k-window to be k contiguous terms in the sequence. There are ***n*** - ***k*** + 1 k-windows in a sequence of ***n*** integers so long as ***n*** ≥ ***k***. We can label each of these windows with their starting index, with the leftmost window having the label 1. Naturally, we can define the sum of a specific k-window to be the sum of the terms within the window. We can sort each of the ***n*** - ***k*** + 1 k-windows in a sequence of ***n*** integers based upon the sum of each window, with windows with larger sums coming first. If two k-windows have the same sum, we break ties by having the one with the lower label come first.

For this problem, given a sequence of ***n*** integers and a value of ***k*,** determine the sorted order of each of the k-windows of the sequence.

Input

The first line will contain two space separated integers, ***n*** ($1 \le n \le 10^5$) and ***k*** ($1 \le k \le n$), representing the length of the input sequence and the size of the windows, respectively. The next line will contain ***n*** space separated integers x_i ($1 \le x_i \le 10^9$), representing the i^{th} value in the sequence.

Output

Output ***n*** - ***k*** + 1 space separated integers representing the sorted order (as defined above) of all of the k-windows, where each integer is the label of the window represented.

Samples

Input	Output
5 3 2 3 4 3 2	2 1 3
10 4 14 12 18 19 13 12 14 14 10 20	1 2 3 4 7 5 6

Problem D: One Dimensional Sovereigns

Filename: `one`

Time limit: `2 seconds`

The Count has ruled over this portion of the number line for long enough; it is time to appoint a pair of unique integers as king and queen to take over. The Count knows that the compatibility of the king and queen is vital to success, so he wants to pick a pair with the largest possible greatest common divisor. However, he also wants to pick the pair to be as small as possible to keep them humble.

Input

Each test case consists of a single line containing two space separated integers ***a*** and ***b*** ($1 \le \boldsymbol{a} < \boldsymbol{b} \le 5 \cdot 10^5$)

Output

Output a single line containing a pair integers x and y, ($\boldsymbol{a} \le x < y \le \boldsymbol{b}$) such that there is no other pair of integers inside the same range with a larger gcd. If there are multiple pairs with the same gcd, pick the pair with the smallest x. If there are still ties, pick the pair with the smallest y.

Samples

Input	Output
1 5	2 4
3 5	3 4
13 18	15 18
14 27	18 27
12 17	12 16
333126 333456	333141 333434

Problem E: Sum of Cubes

Filename: `cubes`
Time limit: `1 second`

The famous Indian mathematician Ramanujan is noted for saying that every number is special. When asked why 1729 (the number of the cab approaching) was special, Ramanujan is reported as saying, “it’s the smallest number that can be expressed as the sum of two cubes in two different ways.” Indeed $1729 = 1^3 + 12^3 = 9^3 + 10^3$. Help Ramanujan with this problem in general. For a given input integer, n, determine the number of different ordered pairs of positive integers (a, b) such that $n = a^3 + b^3$, with $a \leq b$.

Input

The input consists of a single positive integer **n** ($1 \leq \mathbf{n} \leq 10^{18}$), the input value for that case.

Output

Output a single line containing the number of ordered pairs of positive integers (a, b) with $a \leq b$ such that $n = a^3 + b^3$.

Samples

Input	Output
37	0
1729	2
22168	1

Problem F: Pangrams

Filename: `pangrams`
Time limit: `1 second`

Julie loves pangrams! What is a pangram, you ask? A pangram is a word, phrase, or sentence that contains every letter in the alphabet. Julie wants you to write a program that will help her identify pangrams.

Input

There will be a single line of input, containing the letters A-Z (both uppercase and lowercase), the digits 0-9, and ‘,’, ‘.’, ‘?’, and ‘!’. The input will have in between 1 and 100 characters, inclusive. For the purposes of this problem, do not distinguish between uppercase and lowercase letters.

Output

The output will be “YES” if the input is a pangram, and “NO” otherwise, on a line by itself.

Samples

Input	Output
`the quick brown fox jumps over the lazy dog`	`YES`

Input	Output
`ThequiCk brOwN foxX !!! ju?mpS over the,,.. lazy Dog`	`YES`

Input	Output
`bcdefgHijkLmnoPqrstUvwxyZ`	`NO`

Problem G: Digit Shuffle

Filename: `shuffle`
Time limit: `1 second`

You will be given a number ***n***, and asked to find the largest number that uses the same digits as ***n***. This number may be equal to ***n***.

Input

The input will be a single positive integer ***n*** (***n*** ≤ 10^{100}), without any leading 0s.

Output

The output will be the largest number that uses the same digits as ***n***.

Samples

Input	Output
101	110

Input	Output
842	842

Input	Output
90523	95320

Input	Output
3489345913293450341	9998554444333332110

Problem H: Vowel Count

Filename: `vowel`
Time limit: `1 seconds`

Dr. Orooji noticed that his name has more vowels than consonants. Since he likes meeting people like himself, he has asked you to write a program to help him identify such names. Given a name, determine whether or not it has more vowels than consonants. For the purposes of this question, the vowels are “aeiou”.

Input

The input consists of a single string of lowercase letters with a length in between 1 and 20, inclusive.

Output

On a single line, output 1, if the input name has more vowels than consonants, and 0, otherwise.

Samples

Input	Output
`ali`	`1`
`orooji`	`1`
`arup`	`0`
`guha`	`0`
`travis`	`0`
`meade`	`1`