Problem L. Great team

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	1 second
Memory limit:	64 megabytes

Gibbs: Next!
First Pirate: My wife ran off with my dog and I'm drunk for a month.
Gibbs: Perfect. Next!
Second Pirate: Me have one arm and a bum leg.
Gibbs: It's the crow's nest for you. Next!

In Tortuga the Captain Jack Sparrow and Will Turner set up the great team. And now Jack wants to elect a captain's mate — the most worthy pirate in the new crew, who has fewer disadvantages and can be a role model for the rest.

Without thinking a lot Jack decided to use the following uncomplicated plan to choose the best pirate of the crew. Firstly, he ranks n contenders in one long row, beckons the first one and this first pirate is a current contender to be the mate. Then Jack walks along the row and stares at everybody one by one. He compares the regular pirate with the current contender and if he sees that the regular pirate has fewer disadvantages, then he changes the current contendor to the regular pirate. In the end of this process the new mate will stand near Jack.

Will knows about Jack's plan and wants to count what pirate will have most comparisons while Jack elects. Let's help Will with his calculations.

Input

The first line contains n — the number of pirates in the crew ($1 \leqslant n \leqslant 10^5$). Next line contains n integers: $a_1, a_2, \ldots, a_n$, where a_i is the number of disadvantages of i-th contender in Jack's opinion ($1 \leqslant a_i \leqslant 10^9$). The pirates are numbered in the way they stood in the row in the beginning of the elections. It is guaranteed that the numbers of disadvantages, which the pirates have, are pairwise different.

Output

Output the only integer — the number of a pirate who was compared with others maximal number of times. If there are several such pirates, you can output any of them.

Example

Standard input	Standard output
6 2 5 3 4 1 9	1

Problem M. The secret of identifier

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	1 second
Memory limit:	64 megabytes

Davy Jones: You've been captain of the Black Pearl for 13 years. That was our agreement.
Jack: Technically I was only captain for two years, then I was mutinied upon.
Davy Jones: Then you were a poor captain, but a captain nonetheless. Have you not introduced yourself as Captain Jack Sparrow?

According to the Pirate Code, each of the pirates of the Caribbean at the beginning of their professional career (hereditary pirates — at birth) is assigned by a unique identifier. Pirate's identifier is a string of four hexadecimal digits. However, it is not a usual row of numbers, it is said that personal qualities and life path of its owner are encoded in it by a mysterious way. But no one still could guess this mystical connection.

Once Captain Jack Sparrow, while sitting in captain's cabin, decided to try to find the way to derive some data about a pirate using the identifier. Memories about how he lost the Black Pearl last time gave him the idea that more similar identifiers of two pirates are, bigger chances for these pirates to unite against the Captain, and, as a result, to make a mutiny. The Captain Jack Sparrow, of course, doesn't want to have the mutiny on his ship, but he chose the new team this time and it is going to be a long voyage. Now Jack needs to estimate the opportunities of raising the mutiny on his ship, based on the conclusions. For this aim he first wants to know for each pair of pirates a number of positions in their identifiers in which they are different.

Input

The first line contains an integer n — the number of pirates aboard the Black Pearl ($2 \leqslant n \leqslant 65536$). Each of the following n lines contains four-digit identifier of the respective pirate. Only decimal digits and lowercase Latin letters from "a" to "f" inclusive are used in writing identifiers. Identifiers of all pirates are different.

Output

Output four space separated integers — the amount of pairs of pirates, which have different identifiers exactly in one, two, three and four positions respectively.

Example

Standard input	Standard output
3 dead beef f00d	0 0 2 1

Problem N. Guns for battle!

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	1 second
Memory limit:	64 megabytes

Will: Load the guns.
Annamaria: With what?
Will: Anything. Everything.
Gibbs: Anything we have left. Load the guns! Case shot and langrage. Nails and crushed glass.

"Black pearl" always had some problems with discipline. It is known that you should start solving big problems from solving smaller ones, that is why, firstly, Joshami Gibbs decided to find out who is responsible for servicing the guns during the battle.

It was pretty hard. There are n guns on the ship. All guns are quite heavy and difficult to use, so two gunners are necessary to serve one gun. Since there are $2n + 1$ gunners on board, one gunner has no pair in every battle. So, this pirate gets a role of commander during this battle.

Gibbs wants to make a schedule which will determine pairs of gunners and a commander for $2n+1$ coming battles. Gibbs does not want the same pair of pirates to be on duty more than one time according the schedule because the pirates working in pairs bother each other. Moreover, if during $2n + 1$ battles one of the pirates is a commander twice or more, then Gibbs' team will doubt in indifference of Gibbs, and it also leads to discipline problems. So many restrictions puzzled Joshami Gibbs. Help him make such schedule.

Input

The only line contains one integer n — number of gunners on board ($1 \leqslant n \leqslant 100$).

Output

Output $2n + 1$ lines each containing $2n + 1$ integers from 0 to $2n + 1$, j-th number in i-th line is equal to number of battle where gunners i and j serve the gun together. Battles are numbered from 1. i-th number in i-th line is 0.

Example

Standard input	Standard output

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

Problem O. Black spot

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	1 second
Memory limit:	64 megabytes

Bootstrap: Jones's terrible leviathan will find you and drag the Pearl back to the depths and you along with it.
Jack: Any idea when Jones might release said terrible beastie?
Bootstrap: I already told you, Jack. Your time is up. It comes now, drawn with ravenous hunger to the man what bears the black spot.

Captain Jack Sparrow has got a black spot on his hand and he avoids going to high seas because sea monster Kraken is waiting there for him. But he can't stay in his place due to his freedom-loving nature. And now Jack is going to Tortuga.

There are n islands in the Caribbean Sea. Jack is going to reach Tortuga, sailing from island to island by routes that allow him to be in the high seas for a short time. Jack knows such routes for some pairs of islands, but they could also be dangerous for him. There is a probability to meet Kraken on each route.

Jack is in a hurry and he wants to reach Tortuga visiting as small number of islands as possible. If there are several variants of such paths he will choose a way with the least probability of meeting Kraken. Help Jack find such path.

Input

The first line contains two integers n, m — the quantity of islands and known routes between them ($2 \leqslant n \leqslant 10^5$; $1 \leqslant m \leqslant 10^5$). The second line contains two integers s and t — the number of island where Jack is and the number of Tortuga ($1 \leqslant s, t \leqslant n$; $s \neq t$). Each of the following m lines contains three integers — the numbers of islands a_i and b_i where the route is known and p_i — probability to meet Kraken on that route as percentage ($1 \leqslant a_i, b_i \leqslant n$; $a_i \neq b_i$; $0 \leqslant p_i \leqslant 99$). No more than one route is known between each pair of islands.

Output

In the first line output k — minimal number of islands along the optimal path and p — probability to meet Kraken on that path. An absolute error of p should be up to 10^{-6}. In the next line output k integers — numbers of islands in the order of the path. If there are several such paths, output any of them.

Example

Standard input	Standard output
4 4 1 3 1 2 50 2 3 50 1 4 10 3 4 10	3 0.19 1 4 3

Problem P. Tears of drowned

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	1 second
Memory limit:	64 megabytes

Tia Dalma: Come. What service may I do you? You know I demand payment.
Jack: I brought payment. Look. An undead monkey. Top that.
Tia Dalma: The payment is fair.

Old Captain Jack Sparrow's friend Tia Dalma, the fortuneteller and prophetess, often makes potions. She has an outstanding collection of the rarest ingredients such as rat tails, fingers of drowned, tears of virgins and so on. And all these ingredients require special care.

Recently Tia Dalma received some good skins of bats as a payment, and now she wants to dry them. To dry ingredients fortuneteller usually uses specially prepared books as the magical properties of the skins could be lost during prolonged contact with other objects. Tia Dalma knows how many sheets should be on both sides of the skin to save it unspoiled. For a i-th skin that number is a_i, that is, the distance from it to the neighboring skins and the book cover can't be less than a_i sheets. Help a fortuneteller determine the minimum number of sheets that should be in the book to save rare ingredients from damage.

Input

The first line contains integer n — the number of skins ($1 \leqslant n \leqslant 100$). The second line contains n integers a_i ($1 \leqslant a_i \leqslant 100$).

Output

Output a single number — minimal required number of sheets in the book.

Example

Standard input	Standard output
3 5 10 3	28

Problem Q. Roshambo

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	1 second
Memory limit:	64 megabytes

Bootstrap: Wondering how it's played?
Will: It's a game of deception. But your bet includes all the dice, not just your own. What are they wagering?
Bootstrap: Oh, the only thing we have. Years of service.
Will: So any crew member can be challenged?
Bootstrap: Aye. Anyone.
Will: I challenge Davy Jones.

All that the pirates have on the Flying Dutchman is the years of service that are left for them. Every crewman wants to shorten it. That is why gambling is very popular on the ship, the winner have a chance to shorten his years of service significantly.

Pirates often gather to play "Roshambo", also known as "rock-scissors-paper". The game consists of several sets. In the beginning of each set players stand in a circle, count to three and show one of three gestures simultaneously, conventionally called as rock, scissors and paper. If everyone shows the same gesture or if each of the three gestures is shown, then nobody leave the game and they play another set. If among the shown gestures there are only two different then only players that chose the victorious gesture play the next set. Scissors beats rock, rock beats paper and paper beats scissors. The game continues until the only one player is left, and that pirate is called the winner. The winner's time of service is shortened on the number of years that equals the number of the sets played, while the losers get extra years.

Bootstrap Bill decided to try his fortune. You should help him determine the expected value of prize in case of his victory. Pirates don't know any complicated strategies for this game. So you can suppose that pirates show every gesture equiprobably.

Input

The only line contains integer n - the number of sailors that are going to play, including Bill ($2 \leqslant n \leqslant 100$).

Output

Output the only number — expected amount of years that will be taken off from winner. Absolute or relative error should be no more than 10^{-6}.

Example

Standard input	Standard output
2	1.5

Problem R. Davy Jones's organ

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	1 second
Memory limit:	64 megabytes

Gibbs: Quiet, missy. Cursed pirates sail these waters. You don't wanna bring them down on us, do you? James Norrington: Mr. Gibbs, that will do. Gibbs: She was singing about pirates. Bad luck to be singing about pirates with us mired in this unnatural fog, mark my words.

Two melodies don't go out of Davy Jones's head. One of them or another sometimes emerge in his mind. To get rid of annoying melodies, Davy Jones decided to play them on his organ. At first, he wants consiquently perform first and second melodies. And then Davy Jones is going to play the same notes as the first time but in the reverse order.

If the first and second compositions sound exactly the same, then, according to Davy Jones's idea, the melodies will no longer vary by his subconscious and finally will leave him alone.

Jones recorded the notes of both songs. He was sure in the song's duration, but not really in which place every song begins. But it is not important, because they play cyclically in his mind and you can choose any place as a start in each of them.

Input

In the first line of the input you are given a string of length n — sequence of notes of the first melody. In the second line there is a string of length m — sequence of notes of the second melody ($1 \leqslant m < n \leqslant 10^5$). Each note is represented by lowercase Latin letter. Order of notes in the melody corresponds to their order in its playback accurate within start of the melody.

Output

If it is impossible to play compositions conceived by Davy Jones's way, output `NO`. Otherwise, in the first line write `YES` and in the second — a pair of integers — numbers of notes in the first and second tunes respectively, which you should choose as a start. Numbering of notes corresponds to a record of melodiess in the input and starts from one. If there are several possible solutions, output any.

Examples

Standard input	Standard output
`cdedab` `bac`	`Yes` `5 3`
`aaaa` `bbb`	`No`

Problem S. Caribbean triangle

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	1 second
Memory limit:	64 megabytes

Will: How can we sail to an island that nobody can find with a compass that doesn't work?
Jack: Aye, the compass doesn't point north. But we're not trying to find north, are we?

Once Jack heard the legend of the treasure of the de Ficit family. After drinking enough rum in the surrounding pubs and collecting rumors, he learned the details. An ancient legend says that there are three seals, which are hidden on three surrounding islands. Combining all three seals together one can get the key to unclaimed properties of a valuable nature. An important feature of these islands is that they are located at equal distances from each other.

As you probably know, compass of Captain Jack Sparrow does not point north. It points the way to that thing, which a man, holding the compass in his hand, wants the most. Jack drew the straight line on his map, on which, according to compass directions, there should be one of the islands. Jack knows almost nothing about the islands and can't intentionally change his wishes to find out direction to the other two islands. To save time, he passed the compass first to Pintel and then to Ragetti, so each of them after that drew one straight line on their maps respectively.

Jack suggests that each of them most wanted to find different seals. Help him identify the possible location of the islands.

Input

Each of three lines of input contains description of one straight line. Line is given by the coordinates of different points on it — x_1, y_1, x_2, y_2. It is guaranteed that the lines are pairwise distinct. All coordinates in the input are integers and do not exceed 1 000 by absolute value.

Output

Output the coordinates of the points, corresponding to the desired islands, one point in a line. i-th point must belong to the i-th straight line from the input data. If there are several options for the location of the islands up for an old legend, you can choose any of them. All coordinates in the output should not exceed 10^8 by absolute value. The points should be located at a distance of at least 10^{-6} from each other and no more than 10^{-6} from their respective lines. Pairwise distances between the points should not differ by more than 10^{-6}. It is guaranteed that at least one suitable variant of location exists.

Examples

Standard input	Standard output

`0 -1 1 0`
`0 -1 -1 0`
`0 -1 0 1`
	`1 0`
	`-1 0`
	`0 1.7320508`

`3 1 4 1`
`-2 -1 -4 -1`
`-4 0 4 0`
	`0 1`
	`0 -1`
	`1.7320508 0`

Problem T. Firs seal

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	1 second
Memory limit:	64 megabytes

Jack: Everyone stay calm! We're taking over the ship.
Will: Aye! Avast!
Officer: This ship cannot be crewed by two men. You'll never make it out of the bay.
Jack: Son... I'm Captain Jack Sparrow. Savvy?

And again Captain Jack Sparrow got into a scrape. In attempt to steal the first of three seals, which are neccessary to get the key to the treasure of the de Ficit family, he was seen by a watchful guard. Having run from a castle, where the first seal was, Jack immediately jumped into the nearest horse-drawn vehicle. Now he is rushing along the main road to an exit from fortress. At the end of the road there is a gate, a grille of which can start moving down at any moment.

Now the vehicle is moving with constant speed v but at any moment Jack can release the horse. In this case the vehicle will start slowing down with constant deceleration a. Jack hopes to rush through the gate and don't want to release the horse until he sees that the gate starts closing. If guards of the gate hear an alert and, therefore, the grille starts moving down, Jack will have to decide whether he needs to release the horse.

But there can be such situation that regardless of Jack's decision the vehicle will collide with the grille. In this case the vehicle will not rush through the grille nor stop before the line of the gate. The vehicle is quite slimsy so that it will fall to pieces after collision or even touching the grille. But, of course, it runs counter to Jack's plans. Help Jack determine whether guards of the gate can start closing the grille at such a moment that the vehicle will fall to pieces anyway.

The height of the vehicle equals h, its length is l. The distance from the ground to the lower bound of the grille initially equals H. The grille at any moment can start moving down with constant speed x. At the beginning Jack is far enough from the gate, and the vehicle will stop before the gate without colliding if Jack releases the horse right away.

Input

In the first line of the input there are three space separated integers — l, h and H ($h < H$). In the second line you are given v, x and a in the same format. All numbers in the input are positive integers and don't exceed 1 000. l, h and H are given in centimetres, v and x — in centimetres per second, a — in centimetres per second squared.

Output

Output `Crash` if there is a moment of start of closing the grille that the vehicle will fall to pieces anyway. Otherwise output `Safe`.

Examples

Standard input	Standard output
1 1 1000 1 1 1000	Safe
1000 1 2 1000 1 1	Crash

Problem U. Not so simple years

Input file:	`Standard input`
Output file:	`Standard output`
Time limit:	1 second
Memory limit:	64 megabytes

Bootstrap: Aye, Captain Turner. This ship has a purpose again. And where we are bound, she cannot come. One day ashore, ten years at sea. That's a steep price for what's been done.
Will: Depends on the one day.

It's an open secret that Will Turner is the captain of the Flying Dutchman. In a distant year A he was forced to sign a contract with the goddess Calypso, according to which Will had to go into endless sailing and he could come ashore only B years after leaving. Moreover, the agreement allows Will to spend only one day on land, and after that he must resume sailing for another B years.

Today is an anniversary of his departure since the formation of the contract, that's why this day is very important for Will. Since then he has never come out on the land. To amuse himself a little, every year on this special day Will allocates k minutes to check whether the number of the current year is a prime number, which seems a nail biting from the side. But for Will there is a special meaning in this action, because, according to the legend, at the end of the year, which number is prime, goddess Calypso can cancel one of the previously concluded treaties. Captain of the Flying Dutchman know only one way to check the number's primality. He consiquently divide it by all the natural numbers in a row, starting with 2 and ending with a number, one less than verifiable. As Will not good at math, and he count anything only once a year, dividing one number by another takes him a minute. If after k minutes divider of the number of the year is not found, Will stops counting and considers it prime. At the end of such year he consoles himself with hope that here and now the goddess Calypso will come to him with the good news. So how many years are prime, according to Will, in the period from the first anniversary of departure to the year, when he for the first time will be able to get to shore inclusive, if goddess won't take pity on the pirate?

Input

The only line contains space separated integers A, B and k ($2 \leqslant A, B \leqslant 10^9$; $1 \leqslant k \leqslant 300$).

Output

Output a single integer — amount of years which numbers Will considers prime.

Example

Standard input	Standard output
`23 7 3`	`2`

Will will consider numbers 19 and 23 prime but 18, 20, 21, 22 and 24 — won't.