Problem A. Turn for MEGA

Input file:	canteen.in
Output file:	canteen.out
Time limit:	2 seconds
Memory limit:	256 Mebibytes

A traffic light at the turn for the "MEGA" shopping center from the Novomoskovskiy highway works in such a way that k cars are able to take a turn in one minute. At weekends all the residents of the city drive to the mall to take a shopping, which results in a huge traffic jam at the turn. Administration of the mall ordered to install a camera at the nearby bridge, which is able to calculate the number of cars approaching this turn from the city. The observation started n minutes ago. You should use the data from the camera to determine the number of cars currently standing in the traffic jam.

Input

The first line contains integers k and n ($1 \leqslant k, n \leqslant 100$), which are the number of cars that can take a turn to "MEGA" in one minute and the number of minutes passed from the beginning of observation. The second line contains space-separated integers $a_1, \ldots, a_n$ ($0 \leqslant a_i \leqslant 100$), where a_i is the number of cars that approached the turn during the i-th minute. The observation started at morning, when there were no cars at the turn.

Output

Output the number of cars currently standing in the traffic jam.

Examples

canteen.in	canteen.out
5 3 6 7 2	0
5 3 20 0 0	5

Problem B. Masterpieces of World Architecture

Input file:	game.in
Output file:	game.out
Time limit:	2 seconds
Memory limit:	256 Mebibytes

Maria Ivanovna informed all of her fifth-graders that in a month they would have a class on the topic "Masterpieces of World Architecture." Each of the students had to prepare a short report about a famous architectural structure. As always, the best students prepared their reports in advance and the worst students started preparing for the class only several minutes before it.

The class has begun. According to the tradition, at such classes the children are sitting in a circle and speaking one after another in clockwise order. The best students like to be the first to speak, while the worst students want to be the last because they are trying to finish their reports right during the class.

Maria Ivanovna has asked each student which in turn they want to present their reports. Now she has to decide who will be the first to speak so that as many children as possible will have their turn to speak exactly as they want.

Input

The first line contains the number n of students in the class ($2 \leqslant n \leqslant 10^5$). Maria Ivanovna has numbered all the children from 1 to n clockwise in the order in which they are sitting. The second line contains integers $a_1, \ldots, a_n$ ($1 \leqslant a_i \leqslant n$) separated with a space, where a_i is the number told by the ith student.

Output

Output the number of the student who should start the class "Masterpieces of World Architecture" by presenting their report. If there are several possible answers, output any of them.

Examples

game.in	game.out
4 4 1 2 3	2
3 1 1 1	3

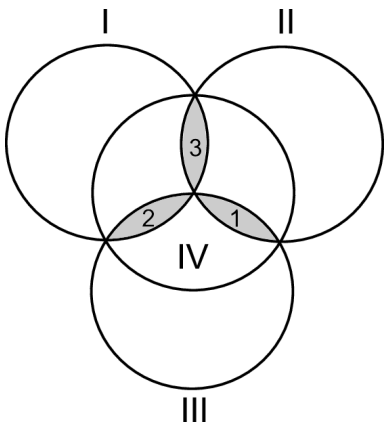
Problem C. Hamming Code

Input file:	hamming.in
Output file:	hamming.out
Time limit:	2 seconds
Memory limit:	256 Mebibytes

Let us consider four disks intersecting as in the figure. Each of the three shapes formed by the intersection of three disks will be called a *petal*.

Write zero or one on each of the disks. Then write on each petal the remainder in the division by two of the sum of integers on the disks that contain this petal. For example, if there were the integers 0, 1, 0, and 1 written on the disks, then the integers written on the petals will be 0, 1, and 0 (the disks and petals are given in the order shown in the figure).

This scheme is called a *Hamming code*. It has an interesting property: if you enemy changes secretely any of the seven integers, you can determine uniquely which integer has been changed. Solve this problem and you will know how this can be done.



Input

The only line contains seven integers separated with a space, each of them being zero or one. The first four integers are those written on the disks in the order shown in the figure. The following three integers are those written on the petals in the order shown in the figure

Output

Output one line containing seven integers separated with a space. The integers must form a Hamming code. The set of integers may differ from the input set by one integer at most. It is guaranteed that either the input set is a Hamming code or a Hamming code can be obtained from it by changing exactly one integer.

Examples

hamming.in	hamming.out
0 1 0 1 1 0 1	0 1 0 0 1 0 1
1 1 1 1 1 1 1	1 1 1 1 1 1 1

Problem D. Lost in Localization

Input file:	heroes.in
Output file:	heroes.out
Time limit:	2 seconds
Memory limit:	256 Mebibytes

The Lavin Interactive Company, which has developed the turn-based strategy *Losers-V*, is constantly extending its target market by localizing the game to as many languages as it can. In particular, they are interested in creating a version of the game in Anindilyakwa, which is one of the languages spoken by indigenous Australians.

However, the localization is complicated by the fact that Anindilyakwa has no numerals. How can a phrase such as "You have seven black dragons and your enemy has forty black dragons" be translated into this language? The localizers have decided to translate is as follows: "You have few black dragons and your enemy has lots of black dragons." They have compiled a table showing the rule of replacing numbers of monsters by Anindilyakwa words.

Number	Designation in Anindilyakwa
from 1 to 4	few
from 5 to 9	several
from 10 to 19	pack
from 20 to 49	lots
from 50 to 99	horde
from 100 to 249	throng
from 250 to 499	swarm
from 500 to 999	zounds
from 1000	legion

Help the localizers automatize the process. Write a program that would output the appropriate word given the number of monsters.

Input

The only line contains the number of monsters n ($1 \leqslant n \leqslant 2000$).

Output

Output the word corresponding to the given number of monsters in the Anindilyakwa language.

Examples

heroes.in	heroes.out
7	several
40	lots

Problem E. Sandro's Biography

Input file:	legend.in
Output file:	legend.out
Time limit:	2 seconds
Memory limit:	256 Mebibytes

Leogius was searching in a library for a book recommended to him by the teacher of theoretical magic. Suddenly he found an ancient chronicle written on several sheets of parchment. Having looked through it, Leogius understood that it described the life and amazing adventures of a lich. Could it be the biography of Lich Sandro that had been lost many centuries ago? If so, the manuscript had to be shown to the Supreme Council of Magicians as soon as possible. But there was one problem: the text contained no mention of the name Sandro. What could be done? The Council might not believe that the chronicle recounted Sandro's life.

Leogius decided to correct the manuscript. He found a magician who was willing to do it. But a good job had to be paid well. The proofreader agreed to replace any letter by any other same-case letter (an uppercase letter by an uppercase letter and a lowercase letter by a lowercase letter) for five gold coins. He also could change the case of any letter for five gold coins. Help Leogius determine the minimal quantity of gold coins he had to pay to make the string `Sandro` appear in the text.

Input

The only line contains the text of the manuscript. It consists of lowercase and uppercase English letters. The number of letters in the text is at least six and at most 200.

Output

Output the minimal quantity of gold coins that must be paid to make the name Sandro appear in the text.

Example

legend.in	legend.out
MyNameIsAlexander	20

In the example the corrector will have to perform four operations after which the line will sequentially take the following form: `MyNameIsAlesander`, `MyNameIsAlesandrr`, `MyNameIsAlesandro`, and `MyNameIsAleSandro`.

Problem F. Searching for the Dodecahedron

Input file:	mouse.in
Output file:	mouse.out
Time limit:	2 seconds
Memory limit:	256 Mebibytes

The Great Dodecahedron is an ancient powerful artifact. It is kept at the Temple of Five Polyhedra together with other magical artifacts. Many magicians tried to get it but to no avail, because a protection spell is put on the Dodecahedron.

There is a row of n pedestals in the fourth hall of the Temple. The pedestals are numbered from left to right starting from 1. The Great Dodecahedron is mounted on one of the pedestals, and the other pedestals support its exact copies, which have no magical power.

If a magician touches the real Dodecahedron, all the copies will disappear at once. If a magician touches a copy, nothing will happen, but, as soon as he removes the hand, the Dodecahedron will shift to a neighboring left or right pedestal and a copy will appear in its place.

Of course, the spell stops any unfair attempts to get the Dodecahedron, because any magician will die immediately if he touches several dodecahedra simultaneously.

Theoretical magicians from all over the world have been trying to invent an algorithm for finding the Great Dodecahedron for many centuries, but they have not succeeded yet. Can you help them?

Input

The only input line contains the number n of pedestals in the fourth hall of the Temple of Five Polyhedra ($2 \leqslant n \leqslant 100$).

Output

In the first line output the number m ($m \leqslant 1\,000$) of touches necessary to find the Dodecahedron. In the second line output m integers separated with a space; these should be the numbers of pedestals in the order in which the dodecahedra mounted on them should be touched.

The algorithm must achieve the goal for any initial position of the artifact and for any of its admissible transitions. It is guaranteed that there exists at least one such algorithm in which at most one thousand touches are made.

Example

mouse.in	mouse.out
3	2 2 2

Problem G. Searching for the Truth

Input file:	mousecheck.in
Output file:	mousecheck.out
Time limit:	2 seconds
Memory limit:	256 Mebibytes

The Supreme Council of Magicians has been studying the recently found biography of Lich Sandro for many days. At present they are investigating a mystic numerical sequence written on one of the pages. Most of the magicians think that this sequence defines an algorithm for finding the Great Dodecahedron.

As you remember, the Great Dodecahedron is kept at the Temple of Five Polyhedra. Many magicians tried to get it but to no avail, because a protection spell is put on the Dodecahedron.

There is a row of n pedestals in the fourth hall of the Temple. The pedestals are numbered from left to right starting from 1. The Great Dodecahedron is mounted on one of the pedestals, and the other pedestals support its exact copies, which have no magical power.

If a magician touches the real Dodecahedron, all the copies will disappear at once. If a magician touches a copy, nothing will happen, but, as soon as he removes the hand, the Dodecahedron will shift to a neighboring left or right pedestal and a copy will appear in its place.

The Supreme Council of Magicians assumes that the numbers in the sequence correspond to the numbers of pedestals and define the order in which the dodecahedra should be touched. Help the Council verify that this algorithm can actually be used to find the artifact regardless of its initial position and for any of its admissible transitions.

Input

The first line contains the number n of pedestals and the number m of integers in the sequence ($2 \leqslant n, m \leqslant 100\,000$). The sequence itself is given in the second line, which contains m positive integers not exceeding n.

Output

Output YES if the sequence defines a correct algorithm for finding the Great Dodecahedron and NO otherwise.

Example

mousecheck.in	mousecheck.out
3 2 2 2	YES
3 3 1 2 3	NO

Problem H. Tray 2

Input file:	plates.in
Output file:	plates.out
Time limit:	2 seconds
Memory limit:	256 Mebibytes

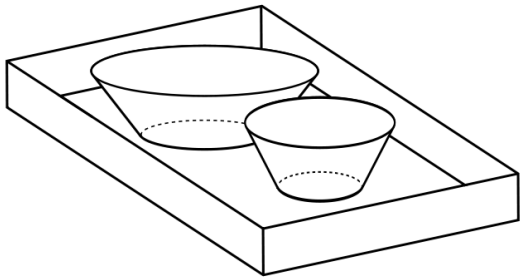
One of the organizers of the Ural Regional School Programming Contest came to the university cafeteria to have lunch. He took a soup and a main course and tried to arrange them on a small rectangular tray, which was not so easy. "Oops, that's a problem," he thought. "Oh, yes, that's a problem! A nice problem for the contest!"

The Ural State University's cafeteria has trays with a rectangular $a \times b$ bottom and vertical borders of height d. Plates have the shape of a truncated cone. All the plates in the cafeteria have the same height h. The organizer wants to put the plates on the tray so that their bottoms adjoin the bottom of

the tray completely. Can he do it?

Input

The first line contains the integers a, b, and d separated with a space. Each of the following lines describes one of the plates and contains two integers. The former integer is the radius of the plate's bottom and the latter integer is the radius of the circle formed by the edge of the plate. The last line contains the height h of the plates. All the input integers are positive and do not exceed 1 000.



Output

Output `YES` if the plates can be arranged on the tray and `NO` otherwise.

Examples

plates.in	plates.out
10 10 10 1 2 1 2 5	YES
8 4 1 1 2 1 3 1	NO

Problem I. Husband in a Shop

Input file:	shop.in
Output file:	shop.out
Time limit:	2 seconds
Memory limit:	256 Mebibytes

Mark comes home after a day of hard work. His wife, instead of feeding him, sends him to buy some bread. When Mark comes to a local shop, there is a long line of equally unhappy husbands. Mark joins the line. Fortunately, the line is moving rather quickly because each husband is asked to buy only one kind of a product.

When each husband comes to the counter, he asks for some amount of the product he needs to buy. If this amount of the product is available, he buys it and leaves the shop. If he is told that this product is unavailable, he gets terribly upset and also leaves the shop. If the available amount of the product is less than he needs, he doesn't know what to do and calls his wife for advice. In order to make a call without delaying the line, he lets one person come forward and calls his wife while standing second in line. When he says to his wife that there are only p units of the product available, the wife tells him to buy all p units. After that he comes to the counter once again and, if the amount of the product is still the same, buys it. Otherwise, he lets one more person come forward and calls his wife again. If it happens so that the product is no longer available after a call, the customer leaves the shop empty-handed.

Mark is eager to return home and have dinner at last. Your task is to determine how many minutes will pass before he gets to the counter for the first time. Each customer spends exactly one minute at the counter and has enough time to call his wife if necessary while the following in line customer speaks to the shopgirl.

Input

The first line contains the number m of different products sold at the shop ($1 \leqslant m \leqslant 1\,000$). Each of the following m lines describes one product. The descriptions have the form *name amount*, where *name* is the name of the product (a nonempty string of length at most 20 consisting of lowercase English letters) and *amount* is the amount of units of this product left by the moment Mark entered the shop (it is a nonnegative integer not exceeding 1 000). All the products have distinct names.

In the following line you are given the number n of customers standing in the line before Mark ($1 \leqslant n \leqslant 1\,000$). The following n lines describe the products these customers want to buy in the same format in which the products in the shop are described. There can be more than one customer who want to buy the same product. Customers may want to buy a product that is not available at the shop. The information on the customers is given in the order from the beginning of the line to its end.

Output

Output the number of minutes that Mark will stand in line before he gets to the counter for the first time.

Example

shop.in	shop.out
3 sweet 2 milk 4 sausage 1 4 milk 2 sweet 3 milk 3 cheese 1	6

Problem J. Amusement Park

Input file:	tickets.in
Output file:	tickets.out
Time limit:	2 seconds
Memory limit:	256 Mebibytes

On a sunny Sunday, a group of children headed by their teacher came to an amusement park. Aunt Frosya, who was a very kind and quiet person, worked at the ticket window on that day. The teacher gave her the money but didn't say how many tickets she wanted to buy. Could Aunt Frosya determine it knowing only the numbers of different notes the teacher gave? It is assumed that the teacher didn't give extra notes, which means that there would not be enough money for the tickets if any of the notes

was taken away.

Input

The first line contains six nonnegative integers separated with a space; these are the numbers of 10, 50, 100, 500, 1 000, and 5 000 rouble notes the teacher gave to Aunt Frosya. In the second line you are given the price of one ticket; it is a positive integer. All the integers in the input data do not exceed 1 000.

Output

Find the number of tickets the teacher wanted to buy. Output the number of possible answers in the first line. The variants in ascending order separated with a space must be given in the second line. It is guaranteed that there is at least one variant of the answer.

Examples

tickets.in	tickets.out
0 2 0 0 0 0 10	5 6 7 8 9 10
1 2 0 0 0 0 10	1 11

Problem K. On the Benefits of Umbrellas

Input file:	umbrellas.in
Output file:	umbrellas.out
Time limit:	2 seconds
Memory limit:	256 Mebibytes

A group of school leavers had their graduation party at an aquapark. They had a great time, but when they were leaving the aquapark they were surprised by a suddenly cold weather and a heavy rain, which made it quite a problem to get to the trolleybus stop.

It turned out that all the boys in the company had their umbrellas and all the girls were without umbrellas. Of course, each boy, being a real gentleman, volunteered to accompany one of the girls to the trolleybus stop under his umbrella.

If the ith girl gets wet under the rain, she'll get upset by g_i units. If no girl accepts an invitation from the jth boy, he'll get upset by $b_j \cdot k$ units, where k is the number of luckier boys who will accompany girls under their umbrellas. The girls who will go under umbrellas and the accompanying boys will not get upset at all.

Help the boys and girls keep their holiday mood as unspoiled as possible. Determine how they should proceed to make the total upset minimal.

Input

The first line contains the number of girls n and boys m in the group ($1 \leqslant n, m \leqslant 100$). The second line contains the girls' upsets $g_1, \ldots, g_n$ separated with a space. The third line contains the boys' upset coefficients $b_1, \ldots, b_m$ separated with a space. The numbers in the second and third lines are positive integers not exceeding 1 000.

Output

Output the minimal possible total upset.

Example

umbrellas.in	umbrellas.out
2 4 1 100 10 8 6 4	19

Problem L. Uncle Styopa and Buses

Input file:	wicket.in
Output file:	wicket.out
Time limit:	2 seconds
Memory limit:	256 Mebibytes

The local government provided funds for repairing a section of the Big Vasyuki–Small Vasyuki motorway. This is a two-lane road, so it was decided to close one lane for repairs at first and leave the other lane for traffic in both directions.

The cars going in opposite directions have to take turns in passing this section of the road. Naturally, traffic jams accumulated quickly at both ends of the section. Officer Uncle Styopa was assigned to control traffic here. He was lucky to find a couple of decent country roads and put "Detour" signs where necessary. The problem seemed to be solved.

However, it turned out that country roads were not good enough for buses traveling between Big Vasyuki and Small Vasyuki. Fortunately, buses run according to their schedule, so Uncle Styopa knows in advance when and from which direction a bus will come. He also knows the maximal time each bus may spend passing the road section under repair without being late for its destination. Help Uncle Styopa organize the process so that all the buses are in time at their destinations.

A bus may enter the only free lane only if there are no other buses on it. It takes exactly one minute for any bus to pass the road section under repair.

Input

The first line contains the number of buses n from Small Vasyuki to Big Vasyuki ($1 \leqslant n \leqslant 100\,000$). These buses are described in the following n lines in the form of pairs of integers t_i and p_i ($1 \leqslant t_i, p_i \leqslant 10^8$), where t_i is the time in minutes when the arrival of the ith bus is expected and p_i is the maximal number of minutes this bus may spend passing the road section under repair. Then there is a line with the number of buses m going from Big Vasyuki to Small Vasyuki ($1 \leqslant m \leqslant 100\,000$). The following m lines contain their description in the same format.

The buses are described in the order in which they come to the road section under repair. They must pass this section in the same order.

Output

Output YES if Uncle Styopa can organize the traffic so that no bus is late and output NO otherwise.

Example

wicket.in	wicket.out
2 1 1 1 2 1 2 2	YES
2 1 1 1 2 1 2 1	NO