1. The contest will last from 7pm – 11pm.
2. There are 7 questions.
3. When you submit your program, please specify the 4-digit problem number.
4. You may start now. Good luck!

1600. Airport

Time Limit: 1.0 second
Memory Limit: 64 MB

A new system for preventing airplane collisions is installed at the Koltsovo airport. The system traces all flying objects within a certain radius of action: airplanes, helicopters, parachutists, etc. It is assumed that objects move in straight lines with constant speeds, and their motions are calculated according to this model. If the distance between two objects becomes equal to some critical value *d*, the system gives an alarm. You are given coordinates and velocities of objects. Determine the pair that will first cause an alarm.

Input

In the first line you are given the number *n* (at most 500) of objects within the range of the system and the critical distance *d* (from 0.1 to 10000). Each of the following *n* lines contains the current coordinates (*x*, *y*, *z*) and the velocity components (v_x, v_y, v_z) of a flying object. The absolute values of coordinates do not exceed 10000, and the absolute values of velocity do not exceed 100. At the initial moment, the objects are at safe distances from each other.

Output

If there will be an alarm, then output "ALARM!" in the first line. The second line must contain the time *t* of the first alarm (up to the third fractional digit) and the numbers of the objects at the critical distance from each other at that moment *a* and *b*; the initial time moment is 0. If at the moment *t* there are several pairs of objects at the critical distance, then output any of them. The objects are enumerated from 1 to *n* in the order in which they are given in the input. If there are no alarms, output "OK".

Sample

input	output
2 1.0 1.0 1.0 -1.0 0.0 0.0 10.0 0.0 0.0 4.0 2.0 0.0 0.0	ALARM! 0.500 1 2

Problem Author: Vladimir Yakovlev
Problem Source: IX USU Open Personal Contest (March 1, 2008)

1603. Erudite

Time Limit: 1.0 second
Memory Limit: 64 MB

Petr likes to solve crossword puzzles and other conundrums. Once he found in a newspaper a new puzzle called "Erudite". There was a square table 4 × 4 filled with letters. It was required to find in the table as many words as possible; the words could go up, down, to the right, or to the left and break at right angles any number of times but they could not have self-intersections.

Petr's friend Vasya told him that it was very silly to spend time solving this puzzle. He told it was much easier to write a program that would search for the required words in a dictionary. Petr was offended and told Vasya: "If you are that clever, write the program yourself. I will cope with the puzzle myself, the way I like." Help Vasya to get out of the situation. You should write this program.

Input

The first four lines of the input contain a table 4 × 4 consisting of lowercase English letters. In the next line there is the number n ($n \le 100$) of words in the dictionary. These words are given in the following n lines, one word per line. Each word consists of lowercase English letters and has length from 1 to 16.

Output

For each word from the dictionary output "YES" if this word can be found in the table and "NO" otherwise. Use the format given in the sample.

Sample

input	output
abra adac babr arca 3 abracadabra ababaab ababaaba	abracadabra: YES ababaab: YES ababaaba: NO

Problem Author: Vladimir Yakovlev
Problem Source: IX USU Open Personal Contest (March 1, 2008)

1604. Country of Fools

Time Limit: 1.0 second
Memory Limit: 64 MB

The chief traffic policeman of the Country of Fools wants to impose a speed limit on the motorway going from the Field of Wonders to the City of Simple Simons. He ordered n speed limit signs. When the order arrived it turned out that the signs had different numbers on them, which showed limits in kilometers per hour. There were k different limits: n_1 signs with the first limit, n_2 signs with the second limit, etc.; $n_1 + \ldots + n_k = n$.

To make the life of drivers not so easy, the chief policeman decided to place the signs on the motorway in such a way that a driver would have to change speed as many times as possible. According to the traffic regulations in the Country of Fools, a speed limitation is valid until the following speed limit sign, and the speed shown in the sign must be observed exactly. For example, if there is the number 60 on the sign, then a car must go until the following sign with the speed of exactly 60 kilometers per hour.

Input

The first line contains the number k of different types of speed limit signs; $1 \le k \le 10000$. The second line contains positive integers $n_1, \ldots, n_k$ separated with a space. The sum of all n_i does not exceed 10000.

Output

Output the order in which the signs must be place on the motorway, in the form of n integers in the range from 1 to k. Assume that a driver must change speed when the car passes by the first sign, irrespective of the initial speed. If there are several solutions, you may output any of them.

Sample

input	output
2 2 2	1 2 1 2

Problem Author: Alexander Ipatov (idea by Alexander Toropov)
Problem Source: IX USU Open Personal Contest (March 1, 2008)

1605. Devil's Sequence

Time Limit: 0.5 second
Memory Limit: 64 MB

Robodevil likes to do some mathematics between rehearsals of his orchestra. Today he invented devilish sequence No. 1729:

- $x_0 = 0$,
- $x_1 = 1$,
- $x_n = (x_{n-1} + x_{n-2}) / 2$.

For example, $x_{10} = 0.666015625$. Robodevil became interested at once how many sixes there were at the beginning of an arbitrary x_n. In 6 nanoseconds, he had a formula. Can you do the same?

Input

You are given an integer n; $2 \le n \le 100000$.

Output

Output the number of sixes at the beginning of x_n in decimal notation.

Sample

input	output
10	3

Problem Author: Alexander Ipatov
Problem Source: IX USU Open Personal Contest (March 1, 2008)

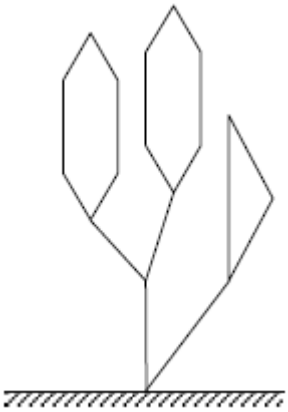
1610. Cactuses

Time Limit: 1.0 second
Memory Limit: 64 MB

There is no doubt that Yekaterinburg trams are the best in the world. Nevertheless, it is Saint-Petersburg that has the largest tram network in Russia. Not long ago, the Saint-Petersburg tram network was included into the Guinness Book of Records as the largest in the world.

Two fans of the tram forum from Yekaterinburg decided to make a trip to Saint-Petersburg to visit the centenary celebration of the tram launch in that city. From their Saint-Petersburg friends they learned that in the previous 15 years the amount of tram service had been constantly decreasing. In many avenues, tram lines were dismantled. Tram service in the city center was minimized, and the city tram network was divided into three fragments, so that it was no longer possible to get by tram from any part of Saint-Petersburg to any other part.

Another thing the travelers learned was that cactuses were in fashion in Saint-Petersburg. Upon their return to Yekaterinburg, they decided to plant a cactus at their office. A cactus is a connected undirected graph such that each of its edges belongs to at most one simple cycle. One vertex of a cactus touches the ground and is called its root.



However, it soon turned out that cactuses became too popular, and all fans of the tram forum already had them. Then the friends decided to get rid of their cactus by a very unusual method: they by turns choose some edge of the cactus and chop it up. This edge is removed, and if the cactus breaks into two parts, then the part that is not connected to the root anymore is thrown out.

The friends have bet a monthly tram ticket on who will chop the last edge growing from the root. Determine who will win if they both play optimally.

Input

Along with the vogue of cactuses, the friends follow the Saint-Petersburg vogue to describe the set of edges of a cactus by a family of paths such that in each path all edges are different. The first line contains the amount n of vertices of the cactus, the amount m of paths, and the number r of the root vertex; $1 \le r \le n \le 50000$.

lines describes a path in the form of a sequence of its vertices. Each description starts with the length of the sequence n_i ($2 \le n_i \le 100000$). Then there are n_i integers, which are the numbers of vertices of the path, in the order in which they are on the path. Adjacent vertices of any path are different. There can be at most one edge between any two vertices of the cactus. Each edge of the cactus is given in the input only once.

Output

Output “First” if the person who makes the first move wins a monthly ticket assuming that both play optimally. Otherwise, output “Second”.

Samples

input	output
17 2 1 15 3 4 5 6 7 8 3 2 9 10 11 12 13 14 9 6 2 1 15 16 17 15	First
16 2 1 15 3 4 5 6 7 8 3 2 9 10 11 12 13 14 9 5 2 1 15 16 1	Second

Problem Author: Alexander Ipatov, Vladimir Yakovlev

Problem Source: The 12th Urals Collegiate Programing Championship, March 29, 2008

1611. Decimation

Time Limit: 0.5 second
Memory Limit: 64 MB

Decimation was a form of extreme military discipline used in the Roman Army, when every tenth soldier was executed.

Do you think it is easy to work as a conductor in a tram? Persistent fare dodgers always try to ride free of charge, and ticket inspectors fine without remorse not only fare dodgers but also tram conductors because they don't cope with their duties.

In the course of operation *Fare Dodger 2008*, which was carried out recently by the Yekaterinburg Association of Ticket Inspectors, it turned out that in every tram there was at least one fare dodger at the moment of inspection. Chief Ticket Inspector of Yekaterinburg became furious and decided to punish conductors. He ordered to line them up in a column and to fine every tenth conductor a sum equal to an average conductor's salary.

Chief Fare Dodger of Yekaterinburg felt sorry for poor conductors and decided to help them, because he knew that some of the conductors were good and coped with their duties. Before conductors are fined, Chief Fare Dodger can place into the column some of his friends, who are also fare dodgers. Chief Ticket Inspector doesn't suspect this and will fine every person whose number in the column is a multiple of 10 (the number of the first person in the column is 1). Help Chief Fare Dodger to place his friends in the column so that the total number of fined fare dodgers and good conductors be minimal.

Input

The first line contains integers n ($1 \le n \le 10000$) and k ($0 \le k \le 50$) separated by a space; they are the number of conductors in the column and the number of Chief Fare Dodger's friends who are ready to help the conductors. The second line consists of n symbols; the ith symbol is "1" if the ith place in the column is initially occupied by a good conductor, and "0" if the conductor is bad.

Output

In the first line, output the minimal total number of fined fare dodgers and good conductors. In the second line, output the number m of fare dodgers that should be placed in the column, and then output m integers, which are their numbers in the resulting column. The numbers must be separated by a space.

Samples

input	output
10 2 0000000001	0 2 5 12

10 2 1111111111	1 0

Problem Author: Alexander Ipatov (idea — Stanislav Vasilyev)
Problem Source: The 12th Urals Collegiate Programing Championship, March 29, 2008

1613. For Fans of Statistics

Time Limit: 1.0 second
Memory Limit: 64 MB

Have you ever thought about how many people are transported by trams every year in a city with a ten-million population where one in three citizens uses tram twice a day?

Assume that there are n cities with trams on the planet Earth. Statisticians counted for each of them the number of people transported by trams during last year. They compiled a table, in which cities were sorted alphabetically. Since city names were inessential for statistics, they were later replaced by numbers from 1 to n. A search engine that works with these data must be able to answer quickly a query of the following type: is there among the cities with numbers from l to r such that the trams of this city transported exactly x people during last year. You must implement this module of the system.

Input

The first line contains the integer n, $0 < n < 70000$. The second line contains statistic data in the form of a list of integers separated with a space. In this list, the ith number is the number of people transported by trams of the ith city during last year. All numbers in the list are positive and do not exceed $10^9 - 1$. In the third line, the number of queries q is given, $0 < q < 70000$. The next q lines contain the queries. Each of them is a triple of integers l, r, and x separated with a space; $1 \le l \le r \le n$; $0 < x < 10^9$.

Output

Output a string of length q in which the ith symbol is "1" if the answer to the ith query is affirmative, and "0" otherwise.

Sample

input	output
5 1234567 666666 3141593 666666 4343434 5 1 5 3141593 1 5 578202 2 4 666666 4 4 7135610 1 1 1234567	10101

Problem Author: Alexander Ipatov
Problem Source: The 12th Urals Collegiate Programing Championship, March 29, 2008