Problem A. Spaceport

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	64 MB

For many years spaceships didn't fly from the Earth's surface. In geostationary orbit, a huge spaceport, connected with the Earth by ropes of carbon nanotubes, was built. People and cargo are delivered on the orbit by elevators on these ropes. It turned out that the space elevator is much more comfortable and cheaper than a spaceship.

Tomorrow a group of key employees of the corporation "Akross" will go to the spaceport with secret ideological mission. The management of spaceport allocated a special double elevator to deliver them. The Head of "Akross" demanded that at any given time the total importance of staff in the elevator does not exceed some fixed value. Under this condition, even in case of emergency incident the loss of the corporation will not be irreplaceable. Employees enter the elevator in turn. The elevator is sent up if two people entered it or only one person entered, but the following person behind him is so significant for the corporation that it is impossible to send them together in one elevator.

The management of spaceport wants to know the maximum number of transportation that may be required to deliver all employees in order to prepare the right amount of oxygen cylinders and charged batteries in advance.

Input

The first line contains integers n and s that are the amount of employees of "Akross" preparing to do the job, and the maximum total importance of two employees which can go together in the elevator ($1 \leqslant n \leqslant 10^5$; $1 \leqslant s \leqslant 10^9$). The second line contains integers $v_1, \ldots, v_n$ that are the importance of the employees ($1 \leqslant v_i \leqslant s$).

Output

In the first line output the maximum amount of trips of the elevator. In the second line output the importance of staff in order from the first employee in the line to the last, for which the elevator will do this amount of trips. If there are several possible answers, output any of them.

Example

standard input	*standard output*
`6 6` `1 2 3 3 4 5`	`5` `2 5 1 3 4 3`

Problem B. Mars Canals

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	64 MB

Mars was the first planet colonized by people. After a long terraforming its appearance has changed completely. From the red desert it has become a blue planet filled with water. There was so much water that some of the cities were built not on land, but on stilts over the water. The most famous one was Neo-Venice. There are canals instead of roads and numerous gondolas instead of cars in this city. All this attracts in Neo-Venice huge crowds of tourists from the Earth. The most popular activities among them are boat excursions. Gondolas are driven by young girls who can not only bring tourists through the canals but also tell them about the history of the city or sing a song along the way. Due to the love for the water these girls are called undines.

The undine Anna has just received a license to drive a gondola. Tomorrow she will carry tourists on excursion to the St. Peter's canal. This canal is narrow, but many popular routes are passed through it, so there always are a lot of gondolas. Anna is afraid that her excitement may lead to crash with another gondola during the excursion. However, all undines are trained to drive the gondola smoothly and with the same speed, so the only threat comes from gondolas floating in the opposite direction. Anna knows the schedule of her colleagues and when she herself will come to the canal. Now she wants to know at what points of time she will meet other gondolas in order to prepare for it in advance.

Input

The first line of the input contains integers n, t and s. n is the number of undines, who will go through the St. Peter's canal in the opposite direction ($1 \leqslant n \leqslant 100$). t is the time at which the gondola passes the entire canal ($1 \leqslant t \leqslant 100$). s is the moment of time at which the Anna's gondola will come to the canal ($360 \leqslant s \leqslant 1200$). The second line contains integers s_1, …, s_n that are the points of time at which the gondolas of Anna's colleagues will appear on the opposite side of the canal. $s - t < s_1 < \cdots < s_n < s + t$.

Output

Output n numbers that are the points of time when Anna will meet her colleagues, with absolute or relative error no more than 10^{-6}. Numbers should be separated with spaces or line feeds.

Example

standard input	*standard output*
2 60 600 600 630	630.000000 645.000000

Problem C. Signal Transmission

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	64 MB

In the middle of the 23rd century alien creatures came out from hyper-leap and suddenly attacked the Twenty-fifth colonizing expedition when all its members gathered in a concert of one of the most popular singers in the whole Galaxy. Nearly a third of all members of the expedition died during panic and crush.

Since then control of hyperspace has become one of the highest priorities of the Defense Forces. Automatic drones with sensors of vibration level of the hyperspace field were sent to the farthest corners of the inhabited part of the Galaxy. However, collecting data from them has become a quite complicated technical problem. The point is that a huge amount of energy is required to transfer data without distortions to such distances. Even the usage of intermediary retransmitters doesn't improve the situation much. However, engineers managed to find an enough elegant solution. The retransmitter sends not the received value, but an absolute value of the difference between it and some number, which is imprinted in the memory of this retransmitter. These numbers are chosen in such a way that in case of normal vibration fixed by sensor the latter retransmitter should send a number which is close to zero. So, the situation is supposed to be abnormal when the latter retransmitter sends the number, strictly greater than one. Security experts are interested how reliable the system of k retransmitters is, and what sensor readings will be interpreted as a calm state of hyperspace field. You are delegated to study this question.

Input

The first line contains an integer k that is the total number of retransmitters ($1 \leqslant k \leqslant 10$). The second line contains integers $a_1, \ldots, a_k$ that are the values recorded in the memory of retransmitters in the order the signal follows from the sensor of the hyperspace field to the receiver on the scout ship ($-1000 \leqslant a_i \leqslant 1000$).

Output

In the first line output the integer n that is the amount of segments in answer. In the i'th of the following n lines output integers $l_i \leqslant r_i$ that are the ends of the i'th segment. The segments must be output in the ascending order of coordinates and without mutual intersections.

Example

standard input	*standard output*
3 0 4 2	4 -7 -5 -3 -1 1 3 5 7

Problem D. Back to future

Input file:	*standard input*
Output file:	*standard output*
Time limit:	3 seconds
Memory limit:	64 MB

The discovery of superluminal neutrinos gave birth to a whole chain of scientific achievements. At first, scientists were able to disperse up to superluminal speeds individual protons and neutrons, then the whole atoms, and soon small objects. But the most surprising effect was that the objects dispersed to the superluminal velocity along a closed path simply went into the past. Moreover, the scheme of such an accelerator was so simple that even an ordinary microwave oven with a little refinement could send an unripe banana a week ago to make it ripe.

Although experiments on sending objects back gave excellent results, they do not always go smoothly. Sometimes an object that was sent back in time faced his version of the past. After one of such collisions a black hole appeared and managed to swallow half of the research laboratory before it collapsed. Despite such incidents, the researchers continued to work for a stable displacement of large objects. Soon the transport ship "Valkyrie-500" was launched in the mass production. Due to superluminal move it could arrive to the destination before the time of departure.

Intelligence reported that the leader of the insurgency comes to visit the one of the distant planets. You, as the most talented special agent, are delegated to destroy him at the moment of arrival before the press attacked him. You have a schedule of all flights of "Valkyries" in this sector of the Galaxy and the right to use any of them. But remember that if you will be at least twice in the same planet at the same time, you will be able to face yourself. Since such a meeting would be likely fatal, it can not be allowed until the job will be done.

Input

The first line contains integers n and m that are the total number of planets in the sector and flights of "Valkyries" between them ($1 \leqslant n \leqslant 10^5$; $0 \leqslant m \leqslant 10^5$). In the following m lines the flights are described. A description of each flight consists of the four integers: the numbers of planets of departure and arrival, time of departure and time of arrival. The last line consists of four integers: the number of the planet, where you are, the number of the planet which the leader of the insurgents arrives to, the current time and the time when the leader of the insurgents arrives. All moments of time are integers from 0 to 10^6. The planets are numbered with integers from 1 to n.

Output

If the route does not exist, output "`Impossible`". Otherwise, in the first line output number k. In the second line output k integers that are the numbers of flights, which are used in the order of the route. If there are several ways to get to the destination, output any of them. Flights are numbered with integers from 1 to m in the same order as they are described in the input.

Example

standard input	*standard output*
4 3 1 2 10 20 2 4 50 20 4 3 20 30 1 3 10 30	3 1 2 3

Problem E. Fruit Fields (Division 1 Only!)

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	64 MB

Recently, the ruins of the ancient city have been found on one of the planets in the system of Betelgeuse. Particular attention was drawn to the good preserved temple, which walls were covered with numerous texts. After the transcription it turned out that they tell about the public organization and the culture of the lost civilization.

In particular, the letter stated that production and distribution of food was organized in the heyday of this civilization. It was found that around the city were fields with some edible plants characterized by extremely high yield. In the autumn any citizen could come to any such field and take its share of the fruits. This share was strictly fixed, and the shares of any two residents were equal. No one could take no more, no less than his share. If someone came at the field and saw that there are less fruits than his share, he took nothing and went to another field. The remaining fruits were let to seeds, so from each of them some new fruits would grow next year. This number was always the same and did not depend on the year or from what fruit seeds were collected.

You found plates with some numbers near the place where once the nearest field to the city was. Perhaps an annual account of the fruit remaining at the beginning of winter in this field was carried out on these plates. You also suggested that by this time the quantity of fruits in the field was always less than the size of one share. From year to year the appearance of several plates has changed, and it is possible that more recent of them had a completely different purpose. Find the size of the share per capita and growth rate (how many fruits grew from one next year) which do not conflict with as much as possible number of the oldest plates.

Input

The first line contains an integer n that is an amount of plates ($1 \leqslant n \leqslant 10^5$). The second line contains integers a_0, a_1, $\ldots$, a_{n-1}, written on the plates ($0 \leqslant a_i \leqslant 10^9$). a_0 is written on the oldest plate, a_{n-1} is written on the newest one.

Output

Output integers L, P and k, meaning that integers on the first L plates don't contradict the size of the share P and growth rate k. Integers P and k must meet the following restrictions: $1 \leqslant P \leqslant 2 \cdot 10^{18}$; $0 \leqslant k \leqslant 2 \cdot 10^{18}$ (it is guaranteed that among the solutions of the problem there is one satisfying these constraints). If there are several solutions with maximum value L, output any of them.

Examples

standard input	*standard output*
5 1 2 4 8 0	5 16 2
3 4 2 1	3 5 3

Problem F. New Literature (Division 1 Only!)

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	64 MB

Space tourism in recent years has gained unprecedented popularity. There are a lot of people wishing to look closely at the triple star, walk on the surface of a small asteroid or plunge into the depths of the gas giant. Passenger ships began to fly between all popular star sectors. But there is little problem—flight to places of interest may take several weeks, and you should somehow escape from the boredom, because even a view out of the window varies not so often.

The visual novel is one of the rethinking of conventional literature, appeared after the mass transfer of books on electronic devices. The main difference of the visual novel from the usual book is that its plot, unlike ordinary books can branch out, and after a few pages the reader may have more than one option of choosing which page is next. These moments when the reader has to make choices, called ramifications.

Many readers like to explore the entire novel, reading all possible scenarios. After reaching a possible ending, they return to the beginning of the story and try other ways. You, as the author of the novel "The song of Asya", want to make life of such readers easier. First, the reader, after reading several endings is already beginning to forget for what choices he has already explored all possible ways of further development. So you have decided that the story should not offer options, which lead the reader to the fully researched chains of events. Secondly, you have decided to add a button, which skips all the intermediate pages of a story to the nearest ramification or the final. If you accidentally press this button at a time when the current page is ramification, then nothing happens.

You have made all the chains of choices, leading to all finals, and you want to assess the total number of clicks on the buttons choosing the development of the plot and skipping the unambiguous choices, which the reader needs in the best case to read the entire novel in all its versions.

Input

The first line contains an integer n that is an amount of different endings of the story ($1 \leqslant n \leqslant 10^5$). The i'th from the following n lines contains a non-empty line of lowercase Latin letters, describing all choices of the plot on the way to the i'th ending. It is guaranteed that none of the lines is a prefix of the other line. The total length of lines does not exceed 10^5.

Output

Output the minimum amount of clicks on a button necessary to read all the possible variants of the plot.

Example

standard input	*standard output*
3 aza azc b	4

If we denote the clicks on the button of choice in Latin letters, and the clicks on the button of skipping the unambiguous choices in the symbol "*", one of the optimal strategies is "`b*c*`".

Problem G. Unknown Planet (Division 1 Only!)

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	64 MB

After the end of the Third Galactic War Orion's Belt has become one of the most peaceful sectors of the Galaxy. Although after the defeat of the enemy there are no even space pirates in this sector, the Third Galactic Fleet kept constant watch over it.

Scout ship Macros was hanging on the stationary orbit near Alnitak for the three months. The captain was sitting in his cabin, sipping tea slowly and enjoying the bluish glow of the gas giant, when the assistant came to him.
"Sir, our drones have discovered a previously unknown planet. Moreover, it seems, that it is very close to their course. If one of the drones bumps it, we will have problems. What shall we do, sir?"
The captain calmly took the last sip and said:
"There can't be any *if.* You should know the exact route of your drones as well as the coordinates of the planet. First, find out whether this planet prevents the current task, and then we will decide what measures to take. Do!"
"Yes, sir!"

Observation drones always fly in pair. Both drones fly at the same speed at parallel course, directed along a straight line. The drones communicate through direct laser beam. As soon as one of the drones no more receives a beam from another, it interprets this fact as a possible attack from the side of the enemy, so it immediately stops and starts sending the alarm signal to the main scout ship.

Input

The first line contains integers x_p, y_p, z_p, r_p that are coordinates of the center of discovered planet and its radius. The second and the third line contain integers x_i, y_i, z_i that are coordinates of the first and the second drone in a pair respectively. The coordinates of the drones are different. The fourth line contains integers x_v, y_v, z_v that are coordinates of velocity of the drones. All integers do not exceed 10^5 in absolute value. $r_p > 0$, at least one of the integers x_v, y_v, z_v is different from zero.

It is guaranteed that at the initial time drones operated normally.

Output

If at least one of the drones bumps the planet, output "`Crash`". If both drones stop and start to send alarm signals, output "`Warning`". Otherwise, output "`False alarm`". When the drone is flying at a tangent to the planet it bumps the planet. If the laser beam touches the planet the connection between drones is lost.

Examples

standard input	*standard output*
0 0 0 1 2 0 0 3 0 0 -1 0 0	Crash
0 0 0 1 2 0 0 0 2 0 -1 -1 0	Warning
0 0 0 1 2 0 0 3 -1 0 1 1 0	False alarm

Problem H. Underground train

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	64 MB

When some people travel in the space between the different planets and inspects the new worlds, the others who live on the Earth still get up in the morning, go to work, return back home and try to have a rest. They don't like this situation more and more and envy people who can afford to travel in the space.

That doesn't suit the government of the Earth. Their goal is to make everyone happy, but that is difficult. That is why the government decided to try their program on the small town Lux, and then in the case of success to use the experience to other cities.

Lux's feature is that it is situated in a long underground tunnel and there is only one train inside it. Almost everyone in the town uses the train. The government has bought a brainwashing device and installed it in the train. The device is new and not researched yet. That is why the government decided to limit the number of the stages where the device would be turned on. The statistic about the number of people who daily travel between every pair of stations has already been collected. Now the government should choose the stages where the device could be used to make happy most of the people.

Input

The first line contains integers n and k that are the total number of the stations and the number of stages between stations where the device could be turned on ($2 \leqslant n \leqslant 500$; $1 \leqslant k \leqslant n-1$). The i'th of the next $n-1$ lines contains $n-i$ integers. The j'th integer is the number of passengers traveling from i'th to $(i+j)$'th station. These numbers are non-negative and don't exceed 100. You can assume that every passenger uses the train only once a day.

Output

In the first line write the total number of people who will become happy because of the device. In the second line write k integers in the ascending order — the indexes of the stages where the device should be turned on. The stage between the station i and $i+1$ has the index i. If the problem has multiple solutions you can write any of them.

Example

standard input	standard output
4 1 5 0 6 5 3 5	14 3

Problem I. Enemy fleet

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	64 MB

The flagship Eltreum of the First Galactic Fleet was carrying alert near the center of the Milky Way. Unidentified ships appeared in this sector some time ago and the crew of Eltreum kept a close watch on them. All ships have been counted and classified by the Universal Military Classifier, but their aim and identity has not been clarified.

Suddenly, after nearly a week of staying at one place the unidentified ships began to move. Some of them went into hyperspace, and one of the remaining ones activated a device that created interferences for radars of Eltreum. Visual observation showed that all the remaining ships rushed away from Eltreum, lining up in a chain in non-descending order of their classes: the lightest ships were ahead and the heaviest ships closed the procession. Unfortunately, only one of the ships in this chain has been precisely identified—that one which had a device creating interferences. The classes of the other ships were not defined.

But, perhaps, information from the visual observation could say anything about the remaining ships, couldn't it?

Input

The first line contains integers n and t that is the number of unidentified ships before the hyper-leap and after it ($1 \leqslant t < n \leqslant 5000$). The second line contains integers $c_1, \ldots, c_n$ that are the classes of the ships in the Universal Military Classifier ($1 \leqslant c_i \leqslant 5000$). The third line contains integers k and x that are the number of ship, which was identified, and its position in the chain ($1 \leqslant k \leqslant n$; $1 \leqslant x \leqslant t$). The number of this ship is its number in the list in the second line. Position in the chain is counted from the head of the procession, that is, smaller numbers of classes correspond to smaller positions.

Output

Output the number of possible sets of the remaining ships modulo $10^9 + 7$.

Examples

standard input	*standard output*
5 3 2 1 1 3 1 2 3	1
4 2 1 1 1 1 1 2	3

In the first example only the set $\{2, 3, 5\}$ of ships could remain after the hyper-leap. In the second example the following sets could remain: $\{1, 2\}$, $\{1, 3\}$, $\{1, 4\}$.

Problem J. Educational centers

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	64 MB

Planet Ataraxia is known for its educational centers. There, in conditions of continuous training and control from the early age are brought up people who will take high positions and who will command the fleet and whole planets in future. Each educational center is a small town with all necessary. For ease of construction and accommodation at the center is chosen a square area, divided into equal sized sections 100×100 meters and in each of these sections is built one building, which would become residential or academic. The outer perimeter of the center is twined by fence.

After a successful military operation of the Andromeda nebula the active colonization of habitable planets has been started. The need for people able to take the command and lead people in the new worlds has increased. Therefore, it was decided to build on Ataraxia two new educational centers. Discussion about the details of the project in the local administration is going for many days. During this time was decided that the first center which consists of a^2 sections and that the second center will consist of no more than n^2 sections. The situation is complicated by the fact that according to requirements of the antimonopoly legislation construction works must be performed by at least two different companies, each of them should build an equal number of buildings and an equal number of 100-meters segments of the fence.

As you are responsible for the administration supplies, you understand when they finish discussing the pros and cons of each possible size of the second center a lot of buns and coffee will be eaten, and it's time to buy them. So you're interested in how many different sizes of a second center will meet the requirements of antimonopoly legislation and, therefore, will be fully considered by the administration.

Input

The only line contains integers a and n ($1 \leqslant a \leqslant 10^{12}$; $1 \leqslant n \leqslant 10^{18}$).

Output

Output amount of different sizes of the second center meeting the requirements of antimonopoly legislation.

Example

standard input	*standard output*
`3 6`	`4`

In this example it is possible to build the second center sized 3×3 or 6×6, delegating the construction to three different companies, or to build it sized 1×1 or 5×5, delegating the construction to two different companies.

Problem K. Bats (Division 2 Only!)

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	64 mebibytes

There is a long wire of length l centimetres between two poles where bats like to hang. After a long day at work you like to watch the bats on the wire from your balcony. Some time ago you noticed that they don't like to hang closer than d centimetres from each other. In addition, they cannot hang closer than 6 centimetres to any of the poles, since there are spikes attached to the pole to keep it clean from faeces that would otherwise damage and weaken it. You start wondering how many more bats can possibly hang on the wire. For the purposes of this problem we assume that the bats have zero width.

Input

The first line contains three space separated integers: the length of the wire l, distance d and number of bats n already hanging on the wire. The next n lines contain the positions of the bats in any order. All number are integers, $1 \leq l, d \leq 10^9$ and $0 \leq n \leq 20,000$. You can assume that the bats already hanging on the wire are at least 6 cm from the poles and at least d centimetres apart from each other.

Output

Output one line with one integer — the maximal number of additional bats that can possibly hang on the wire.

Examples

standard input	*standard output*
22 2 2 11 9	3
47 5 0	8

Problem L. Last Digits (Division 2 Only!)

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	64 mebibytes

Given an integer n, find the last 3 digits before the trailing zeroes in $n!$. If there are fewer then 3 such digits, find all of them.

Input

The input contains one line with one integer n ($1 \le n \le 10^8$).

Output

Output one line with the 3 digits before trailing zeroes of $n!$. If there are fewer than 3 such digits, output all of them.

Examples

standard input	*standard output*
5	12
7	504

Problem M. Experiments (Division 2 Only!)

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	64 mebibytes

You are given a sequence of experiment results (success/fail) and a number k. Your task is to find a continuous subsequence of length at least k which has the highest possible success rate among all such subsequences. The success rate of a subsequence is defined as the number of successful experiments divided by the length of the subsequence.

Input

On the first line there is an integer k ($1 \le k \le 100$) denoting the minimal subsequence length. The second line contains a string consisting of characters '0' and '1'. If i-th character is zero, i-th experiment failed; otherwise its succeed.

The length of the string will be at least k and at most 10^5 characters.

Output

The first and only line of output should consist of two integers f and ,l separated by a single space. The integer f is the 1-based index of the first element of subsequence with the best success rate and l is its length. If there are multiple optimal solutions, you can output any one of them.

Examples

standard input	*standard output*
1 01	2 1
4 0110011	2 6