IV ОТКРЫТАЯ ОЛИМПИАДА

ЮЖНОГО ФЕДЕРАЛЬНОГО УНИВЕРСИТЕТА

ПО ПРОГРАММИРОВАНИЮ

ДЛЯ СТУДЕНЧЕСКИХ КОМАНД ВУЗОВ И КОЛЛЕДЖЕЙ

ТУРНИР ПО СПОРТИВНОМУ ПРОГРАММИРОВАНИЮ

(ОСНОВНОЙ ТУР)

26 – 29 марта 2010г.
г. Таганрог

Ограничения

Задача		Время на 1 тест (сек.)	Объем памяти (Мб)	Количество неверных попыток
A.	*Бобслей*	18	32	
B.	*Прыжки с трамплина*	3	32	
C.	*Шорт-трек*	2	32	
D.	*Фристайл*	2	32	
E.	*Керлинг*	14	32	
F.	*Лыжные гонки*	6	32	
G.	*Лыжное двоеборье*	2	32	
H.	*Сноубординг*	2	32	
I.	*Фигурное катание*	2	32	
J.	*Горнолыжный спорт*	2	32	
K.	*Хоккей*	2	32	
L.	*Биатлон*	2	32	
M.	*Конькобежный спорт*	2	32	

PROBLEM A. BOBSLEIGHING

One of the most gripping and dramatic events of the past winter Olympiad in Vancouver was the competition on the bobsleighing route. Organizers made a very twisting and high-speed route. It is said that in order to attain this effect of speed, the special water from several Canadian lakes was taken for the preparation of the ice. Water was evaluated according to special characteristics, and then the secret formula of the selection of exact water for the different parts of the route was used.

As it was possible to explain for journalists, each of the K parts of the route poured separately. It was delivered N samples of water for the pouring in total. Each model was scored according to the special characteristic – how it fits to be used for the pouring of each part. Special characteristic was expressed by the positive integer, which does not exceed 10^9. Thus, each model had K scores of fitness. Then organizers took exactly one sample for each part of the route and, if the sum of characteristics was equal S, the route poured by this collection of water was maximally rapid. Naturally, it is possible to use the same water for the different parts of the route, but the characteristic of water will be different. It turned out that there are several ways of the selection of water, but no one until now could determine, how much?

INPUT

In the first line numbers N, K and S are written. ($1 \le N \le 20000$, $1 \le S \le 10^9$, $2 \le K \le 3$) Then K lines follow. Every line contains N numbers separated by single spaces – special characteristic of the model of the water.

OUTPUT

Write a single number – the number of the methods to select samples for the route.

SAMPLE

INPUT	OUTPUT
3 2 5 1 2 3 3 4 5	2

Problem B. Ski jump

Jumpers on skis are the people with special psychology. In order to accomplish 200-meter flights, the iron will and clear psychological attitude is necessary. Each of those people has their prescription of attitude before the jump. Someone listens the favorite music; someone attempts to see in the mind the moment of future flight for hundredth time. But some of them play the popular game “Bubble breaker”.

Play area in this game is divided into cells, in each cell is located a ball of one of the four colors - blue, red, green or yellow. During his move, the player must remove any region of two or more adjacent balls of one color. The cells of region are adjacent, if they have common side. For each move the player obtains the amount of points equal to P*(P-1), where P is the count of balls in the removed region. The collected points are summarized.

After removing, the balls, which have been located higher than the removed region, fall vertically downward, filling empty areas. Of course the fall of the ball occurs until it is landed onto the occupied cell. Game ends when there are no more regions suitable for the removal.

One of the jumpers modified greedy strategy for this game. The following considerations are applicable for each move:

- If there is such move, which leads to forming the “good situation” for the following move, do this move and following move. Let us denote this move as the first type move.
- If the first type move does not exist, do the optimal move. Let us denote this move as the second type move.

Move on the step k leads to forming the “good situation” for the move at the step of k+1, if by move at the step of k+1 it will be possible to collect more points, than by any other move at the step k. Move at the step k is called optimum, if it gives the larger number of points, than any other move at the step k.

If there are several suitable second type moves, the region, which is located leftmost on the play field, is the candidate for removal. But if in this case there are also several optimal moves, it is necessary to remove the region, which is located higher in the play field.

The position of region along horizontal is determined by the position of its leftmost ball. The position of region along vertical is determined by the position of its uppermost of the leftmost balls.

It is clear that, if there are several first type moves, the move that brings a maximum number of points at the following move should be selected. If there are still several such moves, select the optimum (in the case of the possible equality of optimum moves use the rules given above about the selection of region depending on position in the play field).

Athletes do not want to be distracted from the competition for a long time; therefore they require you to determine the number of points, which can be collected, being guided by this strategy.

INPUT

The first line contains two numbers N and M separated by a space ($1 \le N,M \le 50$) – the dimensions of the area. N lines follow, each contains M characters from the set {Y, B, R, G}. Each character corresponds to the color of the ball: Y(ellow), B(lue), R(ed), G(reen).

OUTPUT

Your program should the number of points.

SAMPLE

INPUT	OUTPUT
5 7 GGGBBRB GGYRRYY BYYGGGY BRBBRRR RBRRYYB	132

PROBLEM C. SHORT TRACK SPEED SKATING

Short track speed skating is a form of competitive ice speed skating. Path for the athletes from one side is bounded by the borders of area, and from another side it is bounded by cones. Cones are arranged in form of the convex polygon.

The task of setting cones is not as simple as it may seem at the first glance. Organizers have a collection from N of points, where it is possible to place a cone. By the requirements of the rules they must place K of the cones in some of the points. Of course, the set of placed cones must form a convex polygon. In this case the organizers want to maximize area of the stadium and place the cones so that they would form the polygon of a maximal possible area. Moreover there is a knowledge that if all the remaining points will be out of the polygon, the competition will pass successfully. Organizers greatly want that everything would be good; therefore it is necessary to satisfy this condition. You have to help the organizers to establish cones on the area.

INPUT

In the first line the numbers N and K are written. ($3 \le N \le 20$, $3 \le K \le 10$, $K \le N$) Each of the next N lines consists of two integers – the coordinates of the point. Coordinates do not exceed 10000 by an absolute value. No three points lie on one straight line.

OUTPUT

In the first line your program should output maximal possible area with exactly one digit after decimal point (even if it is equal to zero). In the second line output K integers: numbers of positions of the cones. Points are numbered in accordance with their appearance in the input information, numeration begins from one. Among the possible answers select lexicographically smallest.

If solution does not exist, output -1.

SAMPLE

INPUT	OUTPUT
5 4 0 0 -1 1 -1 -1 1 2 1 -2	2.5 1 2 3 4
INPUT 4 4 0 0 0 3 3 0 1 1	**OUTPUT** -1

Problem D. Freestyle

Dope scandals in the freestyle are a large rarity. The physical characteristics of athlete do not play the important role as, for example, in the ski races or in the horse races. However, not so long before the Olympiad in Vancouver there was a dope scandal, in which one of the masters of freestyle was involved.

Certainly, the journalists, are the main people at the events who are advantageous of such stories. They attempt to know the details of scandal by all means in order to increase its ratings. There are M of N journalists who already know about this scandal. It is known that for supporting the high rating of this scandal, each day one of the following events must occur. Either someone of the journalists learns about the scandal or someone of the journalists learns that someone of the journalists already knows about the scandal, or someone of the journalists learns that someone of the journalists does not know about the scandal yet. Your task is to determine the maximum number of days during which it is possible to support the high rating of the scandal, if now no one of the journalists knows that someone of the journalists knows about the scandal, and no one of the journalists knows that someone of the journalists does not know about the scandal.

INPUT

Numbers N and M are written in a single line separated by space ($1 \le M \le N \le 10^4$).

OUTPUT

Write an answer in a single line.

SAMPLE

INPUT	OUTPUT
3 1	12
4 2	20

Problem E. Curling

The large number of Olympic broadcasts from Vancouver was devoted to curling, so it became very popular Russia. As you know, to play curling you need to place granite stones to the house of nearer than the stones of rival. In the official matches all stones have identical sizes. But few people know, that during the trainings the stones of different diameter are used. This makes it possible to train different aspects of the game.

The equipment which can photograph the position of stones from the top is used during the trainings. Then data are used for the sportsmen error analysis. However, the information is better if all throws are printed in one photograph by imposition. You should prepare the photo according to the information about the arrangement of stones on ice.

Photograph is rectangle with the size N*M of cells. Each stone in the photograph is a circle with a center in a certain cell and the integer radius. In the photograph all cells (X,Y) of *i*-th circle, the coordinates of centers of which satisfy inequality $(X_0\text{-}X)^2 + (Y_0\text{-}Y)^2 \le R^2$, are painted with color C_i. Here X_0, Y_0 are the coordinates of the center of the circle.

It is certain that after the sequential imposition of the images of all stones some cells can be painted several times, in this case the color of cell is the last color, in which it was painted. Other cells can remain not colored.

INPUT

In the first line of the input three numbers N, M, K are written. ($3 \le N, M \le 2500$, $1 \le K \le 5000$). K lines follow, i-th line consists of four numbers - X_i, Y_i, R_i, C_i ($0 \le X_i < N$, $0 \le Y_i < M$, $1 \le R < \max(N,M)$). Color is specified by one lower-case or capital English letter.

OUTPUT

Your program should output N lines, M characters each – the photograph of the stones. Uncolored cell should be identified by a dot. Colored cell should be identified by a character corresponding to its color.

SAMPLE

INPUT

```
20 30 3
5 6 8 a
10 23 5 b
17 17 10 c
```

OUTPUT

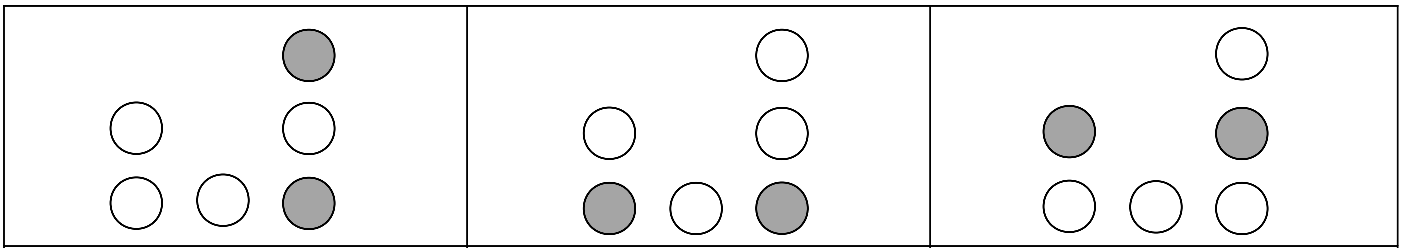
```
aaaaaaaaaaaaa.................
aaaaaaaaaaaaa.................
aaaaaaaaaaaaaa................
aaaaaaaaaaaaaa................
aaaaaaaaaaaaaa................
aaaaaaaaaaaaaaa........b......
aaaaaaaaaaaaaa......bbbbbbb...
aaaaaaaaaaaaaa...c.bbbbbbbbb..
aaaaaaaaaaaaacccccccccbbbbbb..
aaaaaaaaaaacccccccccccccbbbb..
aaaaaaaaaacccccccccccccccbbbb.
.aaaaaaaacccccccccccccccccbb..
...aaaaaacccccccccccccccccbb..
......a.cccccccccccccccccccb..
........ccccccccccccccccccc...
........ccccccccccccccccccc...
........ccccccccccccccccccc...
.......ccccccccccccccccccccc..
........ccccccccccccccccccc...
........ccccccccccccccccccc...
```

PROBLEM F. SKI RACES

The International Federation of Ski Sport constantly works in the direction of making ski races more entertaining. For the last several years many disciplines were tested - sprint races, mass starts, races with changing of skis etc. The large part of them was already represented at the Olympiad in Vancouver. The main effect of making races more entertaining is an increase of the fight directly on the track, as this occurs in the sprint and mass-start. For such races the point of start is very important, in particular the arrangement of athletes is important too.

In the Sochi-2014 it is decided to test the new layout of sportsmen in the starting field. As before, skiers are located in several columns, aligned along the starting line. But now a number of men in each of the columns is determined by the new regulations of the competition. Furthermore, skiers from one country:

- Can't stand in one column.
- Can't stand in one row if all points between them contain other skiers. If one or more places between them are free, they can stay.



Wrong position	Wrong position	Right position

The Federation of Ski Sport requests you to write the program, which determines how many ways to arrange K sportsmen from one country are possible.

INPUT

The first line contains two numbers N and K ($1 \le N, K \le 400$). The second line contains N positive integers separated by a space – the description of starting columns. *i*-th number is the number of athletes in *i*-th column. Numbers are not greater than 1000000.

OUTPUT

Output single integer – the number of ways modulo 10^9+7.

SAMPLE

INPUT	OUTPUT
`3 3` `2 1 3`	`2`

PROBLEM G. NORDIC COMBINED

Nordic combined is the discipline in which the first part is the ski jumps from trampling, and then the sportsmen run the classic ski track. When running the ski track, the sportsmen start according to their loss to the leader calculated from their score on the trampling. The delay for the sportsmen on the start is his/her score lost to the leader multiplied by 4. The sportsman who finished the ski track first is the winner of the whole competition.

But many people in the Vancouver did not enjoy this formula of this competition. They said that this competition is easy predictable. It was decided to try a new scheme in the next Olympic Games in Sochi. Formally, the scheme will be the following. Denote the loss to the leader as N. The number N is cyclically shifted K times, where K is the length of the number N. The cyclic shift is performed as follows: the last digit of the number is deleted and the appended to the start of the number. The leading zeros are allowed, i.e. the number is always K-digit. The delay on the start will be just the sum of all the numbers got during the cyclic shifts.

Your task is to write a program calculating the delay on the start.

INPUT

The input line contains a single integer N. ($1 \le N \le 10^{100000}$).

OUTPUT

You have to output a single integer – the answer to the task.

EXAMPLE 1

INPUT	OUTPUT
`147`	`1332`

EXAMPLE 2

INPUT	OUTPUT
`5`	`5`

PROBLEM H. SNOWBOARDING

The weather during the first day of the Olympics was bad for the sportsmen and for the spectators. But it was also extremely bad for organizers. The pouring rain and the warm days destroyed almost all snow on the snowboard track. The organizers sometimes were forced to change the competition dates in order to have time to recover the track with the saved snow.

But when the track was ready, another problem has arisen – the rain destroyed all the spectator places except the first row of the places for sitting. So it was possible for the spectators to sit only in the first row.

In the competition day, each of the N spectators has taken a place in the first row. But when the tickets were checked, it was found that none of the spectators has taken the appropriate place corresponding to the one listed on the ticket, but all the places were occupied. So it was decided to change the order of spectators such that all the spectators will occupy the places listed on the tickets. The volunteer is allowed to change two neighboring spectators, but only if they occupy the places which do not correspond to their tickets. If the spectator already sits on the place corresponding to his/her ticket, it is not allowed to sit him/her to any other place. Your task is to find the scheme of changing spectators which will move all the spectators to the places corresponding to the ones listed on the tickets. Hurry up, the most interesting part of the competition will start very soon!

INPUT

The first line contains a single integer N. ($2 \le N \le 300$). The second line contain N integers – a permutation of numbers from 1 to N – the initial locations of the spectators. It is guaranteed that in the initial moment there are no spectators sitting on the places corresponding to their tickets.

OUTPUT

If there is no solution, output -1. Otherwise you have to output the number of steps in the moving scheme. Then output the scheme itself, one step on a line. The step is described by two integers – the places of the spectators changed on this step. The number of steps must not exceed 45000. If there are multiple solutions, output any of them.

EXAMPLE

INPUT	OUTPUT
4 2 1 4 3	2 3 4 1 2

PROBLEM I. FIGURE SKATING

The loss of the best Russian skater Eugeny Pluschenko initiated many debates about changing the scoring system. The experts gave many interviews and underlined that the cost of jumping elements is extremely low, but the cost of the «second-row» elements is extremely high. It led to the win of the American skater. But may be the scale of notation of the scores plays the important role… if only there existed a scale of notation in which the given score N had exactly K digits… may be the things might have been changed!

INPUT

The only line contains two integers N and K ($1 \le N, K \le 10^9$) in decimal scale of notation.

OUTPUT

You are to write a single integer – the base of such scale of notation (the base itself must be written in decimal). If there are multiple bases, write the minimal possible. If there are no such scales of notation, write No solution.

EXAMPLE 1

INPUT	OUTPUT
`15 4`	`2`

EXAMPLE 2

INPUT	OUTPUT
`5 5`	`No solution`

Задача J. Mountain ski sport

It is the common thing on the Olympic Games that the mountain ski tracks are the furthest objects of the games. But the organizers did the great job of planning the infrastructure, and they linked all mountain ski objects and the Olympic Town with a road network. But, because most of objects are very far, there is only one path between any two of them (or between an object and the Olympic Town). Of course, the path may pass other objects.

All objects are enumerated from 1 to N, the Olympic Town has number 1. Each object has a sign «>X» or «<X» on it, where «>X» stands for «There are more than other X objects between this object and the Olympic Town» and «<X» stands for «There are less than X other objects between this objects and the Olympic Town».

After visiting the bar, two Russian tourists argued whether it is possible to recover the map of this road network using the information on the signs. Your task is to determine who is right.

INPUT

The first line contains a single integer N. (2 ≤ N ≤ 50000). N-1 lines follow, each containing information from the corresponding sign, starting from the object 2. 0 ≤ X ≤ 100000. The input data never contain «<0».

OUTPUT

You have to output N-1 lines – the description of the road network. Each of the lines must contain two integers ranging from 1 to N separated by a space – the objects connected by a road. If there are multiple solutions, you may choose any of them. If there is no solution, output -1.

EXAMPLE 1

INPUT	OUTPUT
4 >0 <1 <5	1 3 3 2 4 3

EXAMPLE 2

INPUT	OUTPUT
3 <1 >1	-1

PROBLEM K. HOCKEY

After the loss of Russian team in Vancouver many people has their own opinions about the cause of the loss. Some people said the Russian team did not want to fight, other said that all that happen because of frenzy of the Canadians. But the Russian Hockey Association knows for sure that the important cause of loss is about the sizes of Canadian hockey fields, which differ from European ones. As a result, it was decided to surprise Canadian with "Russian" fields in Sochi.

Russian hockey field is a convex polygon. It is said that it is the optimal form for Russians to won the tournament. But it is very hard task for builders of the field to mark the lines on it. At first, they need to draw the central line. It was decided that the central line must pass via the vertices of the polygon, and the ratio of the area of the smaller part to the area of the bigger part is as close to 1 as possible.

Your task is to help the builders to build the central line.

INPUT

The first line contains the only integer T – the number of test cases ($1 \le T \le 10$). T cases follow, each starting from the integer N - the number of vertices of the polygon ($4 \le N \le 2000$), followed by N lines with two integers each – the coordinates of the vertices. The coordinates do not exceed 10000 by an absolute value.

OUTPUT

You are to output two lines for each case. The first line must contain two numbers of vertices the central line passes. The numbers must be in ascending order. The vertices are numbered from 1; their numbers correspond to the order of the input data. The second line must contain a rational number which is less than 1, in form X/Y, where X and Y are positive integers with no common divisors. If there are multiple solutions, you must choose one with the smallest possible number of the first vertex, if there is still a tie, you must resolve it by selecting the second vertex with the smallest possible number.

EXAMPLE

INPUT	OUTPUT
1 5 0 0 -1 3 2 7 5 4 5 1	2 4 21/34

PROBLEM L. BIATHLON

Almost all biathlon TV shows from Vancouver were started when the competition started itself. It was almost impossible to see the preparations before the start. But there were many checkpoints for the sportsmen, for example, at one of the checkpoints the suit of the sportsmen were check, at the other one the weapons were checked, etc. The number of the checkpoints is N. It is known that there are 10 kinds of sportsmen depending on how much time they spend at the checkpoints. The scientists have calculated the latency matrix of size N*10 – it is the time for each kind of sportsmen to spend at each checkpoint.

K sportsmen in order of their starting numbers wish to pass all the checkpoints. At the moment 0, the first sportsman starts to pass the check at the first checkpoint. When the sportsman pass the checkpoint *i*, he/she immediately moves to the waiting queue at the checkpoint *i* + 1. When the checkpoint *j* becomes available, the sportsman from the queue starts to pass check there (if there are waiting sportsmen in the queue).

Your task is to find the time for all sportsmen needed to pass all the checkpoints.

INPUT

The first line of the input contains two integers N and K ($1 \le N \le 1000$, $1 \le K \le 10000$). The next line contains K digits with no spaces – the description of the sportsmen; the digits correspond to kinds of sportsmen. The next N lines contain 10 positive numbers, which do not exceed 10000 – the latency matrix. *i*-th line describes, the time needed to pass the checkpoint with number *i* for the sportsmen of kind 0, 1, 2 etc.

OUTPUT

You are to output just one number – the total check time.

EXAMPLE

INPUT	OUTPUT
3 10 0123456789 10 4 3 7 9 4 6 7 2 11 12 1 1 8 7 3 2 7 2 10 14 2 2 2 2 2 2 8 2 3	76

PROBLEM M. SKATING

Figure Skating Federation wants to conduct a strange experiment. Suits of the sportsmen will contain some strings instead of their numbers. It is planned to do so to increase the quality of the competition. The strings will be generated randomly.

More formally, the process is done in the following manner. The string is a concatenation of random characters chosen uniformly and independently from N first characters of English alphabet. The generation is terminated at the moment when the generated string contains as a substring at least one of the patterns given by the Federation.

Your task is to find the expected value of the length of the generated string.

INPUT

The first line of the input contains two integers N and M ($1 \le N \le 8$, $1 \le M \le 10$). Here N is the number of the characters used, as described above, and M is the number of patterns. The length of any pattern does not exceed 10.

OUTPUT

Output the expected value of the length with two decimal digits after the decimal point.

EXAMPLE 1

INPUT	OUTPUT
2 1 ABA	10.00

EXAMPLE 2

INPUT	OUTPUT
2 2 A AA	2.00