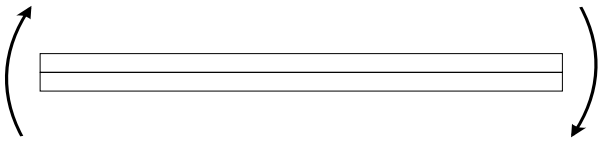
Problem A. Murphy's Law

Input file:	`input.txt`
Output file:	`output.txt`
Time limit:	1 second
Memory limit:	64 MB

Anka was awarded a medal and given a buttered toast for displaying heroism in a combat. The toast was so narrow, flat, and thin that it could be regarded as a straight-line segment of length l. On Commissar Matroskin's advice, Anka turned the toast the buttered side down and, holding it parallel to the ground, brought it to her mouth and was ready to bite, when suddenly...

The toast slipped out of her hands and started falling under gravity. It was rotating at a constant angular velocity about its center of mass in the plane perpendicular to the ground, as shown in the picture.



Your task is to determine which side of the toast touched the ground first.

Input

The first line contains the length l of the toast in centimeters, the distance h from Anka's mouth to the ground in centimeters, and the angular velocity ω of the toast's rotation in revolutions per minute (the toast makes one revolution when it turns 360 degrees). $1 \leqslant l, h, \omega \leqslant 1\,000$. These numbers are integers separated with a space. The acceleration of gravity should be taken equal to $9.81\,m/s^2$.

Output

Output "`butter`" if the toast first touched the ground the buttered side down and "`bread`" otherwise. It is guaranteed that at the moment the toast touched the ground for the first time it wasn't orthogonal to it.

Examples

input.txt	output.txt
10 400 15	butter
10 500 15	bread

Problem B. The Revolution Cup

Input file:	`input.txt`
Output file:	`output.txt`
Time limit:	1 second
Memory limit:	64 MB

At the first stage of the Revolution Football Cup, all the teams are divided into groups and play according to the all-play-all system. The organizers of the tournament ask you to help them form the groups.

The teams should be divided into g groups, t teams in each group. The teams have been distributed to t pots, g teams in each pot. In the first pot there are the strongest teams, in the second pot there are teams that are a bit less stronger, and so on. In the last pot there are the weakest teams. It is required to form groups so that there would be exactly one team from each pot in each group. The organizers also want all t teams in each group to represent different political parties.

Input

The first line contains the integers g and t separated with a space ($2 \leqslant g, t \leqslant 100$). The following lines describe the pots. Each line contains the name of a team and the name of the party it represents. These names are separated with a space. The descriptions of pots are separated with an empty line. The names of teams and parties consist of lowercase English letters, and their lengths are in the range from 1 to 10. The names of all teams are different.

Output

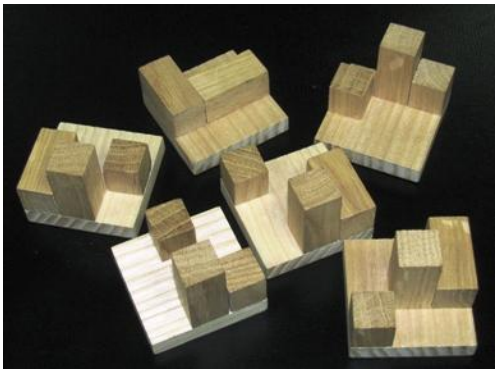
If it is impossible to divide the teams into groups as required, output one line containing the word "`No`". Otherwise, output "`Yes`" and then the description of g groups. Each group is described by the names of t teams that are in this group, each name in a separate line. The description of each group should be preceded by an empty line. If there are several answers, output any of them.

Examples

input.txt	output.txt
2 3 cavalry red guard white infantry red guerilla green czechs white gunners latvia	Yes cavalry guerilla czechs guard infantry gunners
2 2 cavalry red guard white czechs white cossacks white	No

Problem C. Cube Puzzle

Input file:	`input.txt`
Output file:	`output.txt`
Time limit:	2 seconds
Memory limit:	64 MB



Petka's birthday present for Anka was an interesting wooden puzzle, which he had made himself. The puzzle consists of six flat $n \times n$ squares. Each square is lacquered on one side and has the other side divided into n^2 square cells. There are columns with 1×1 sections on some cells; the height of each column is at most n.

Help Anka use these parts to assemble a lacquered $n \times n \times n$ cube or determine that this is impossible. The parts of the puzzle can be rotated arbitrarily.

Input

The first line contains the integer n ($2 \leqslant n \leqslant 20$). Then the six parts of the puzzle are described. Each part is described by n lines consisting of n integers each. These integers are the heights of the columns on this part. The integers in each line are separated with a space. All heights are in the range from 0 to n. The sum of the heights of columns on all parts of the puzzle is n^3.

Output

If it is impossible to assemble a lacquered cube from the described six parts, output the only line "`No`". Otherwise, output "`Yes`" in the first line and then describe the scheme of assembling the cube. This description should contain n blocks, each block containing n lines with n integers in each line. The first block describes the lower layer of the cube, the second block describes the layer lying immediately on the lower layer, and so on. The last block describes the upper layer. The first line in the description of a layer corresponds to the back small cubes, the second line corresponds to the small cubes located immediately in front of the back small cubes, and so on. The last line describes the front small cubes. The small cubes in each line are described from left to right. Each integer is in the range from 1 to 6 and specifies the number of the part which the corresponding small cube belongs to (the parts are numbered from 1 to 6 as they are given in the input). If several schemes of assembling the cube are possible, output any of them.

Examples

input.txt	output.txt
3 0 0 0 1 0 1 1 2 0 1 0 0 1 1 1 0 0 0 0 2 1 1 0 0 0 0 0 0 1 0 0 0 0 0 2 1 1 0 0 0 0 1 0 2 1 0 0 1 0 2 1 1 0 0	Yes 3 4 4 1 4 1 1 1 5 3 3 2 5 6 2 5 1 2 6 4 2 3 6 6 5 5 6
3 0 0 0 0 3 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 2 0 0 0 0 0 0 0 0 0 0 2 0 0 0 0 0 0 2 1 2 2 1 2 2 2 2	No

Problem D. The Czechs' Rifles

Input file:	input.txt
Output file:	output.txt
Time limit:	3 seconds
Memory limit:	64 MB

The Czechoslovak Legion decided to stop the fierce fighting in Siberia and return home. However, it was not so easy to leave Russia, because they had too little money to pay for the sea voyage from Vladivostok to Europe. The Czechs decided to get the necessary amount of money by selling their rifles to the advancing Red troops. The total number of rifles they could sell was n. The first two rifles were ordinary, so the Czechs asked only one rouble for each of them. The ith rifle ($i \geqslant 3$) costs as much as the $(i-1)$th and $(i-2)$th rifles together.

The bank notes that circulated in Russia at that time had nominal values equal to powers of an integer k (there were one-rouble, k-rouble, k^2-rouble notes and so on). The Red troops had occupied enough printing plants for printing the necessary amount of notes. They paid for each rifle the exact amount of money the Czechs asked using the minimal possible quantity of notes.

When the Red Army got hold of the rifles, Chapaev asked Anka to order them according to the quantity of notes paid for each rifle. If the same quantity of notes was paid for two rifles, then the rifle with the smallest number should go first. Help Anka fulfill this request.

Input

The only line contains the integers k and n separated with a space ($2 \leqslant k \leqslant 10$; $3 \leqslant n \leqslant 50\,000$).

Output

Output the permutation of the integers from 1 to n corresponding to the numbers of rifles in the required order.

Example

input.txt	output.txt
10 8	1 2 3 4 8 7 5 6

After Anka fulfills Chapaev's request, the costs of the rifles in roubles will be {1, 1, 2, 3, 21, 13, 5, 8}

Problem E. The Machinegunners in a Playoff

Input file:	`input.txt`
Output file:	`output.txt`
Time limit:	1 second
Memory limit:	64 MB

The Machinegunners women's football team has advanced to the knockout stage of the Revolution Cup. The Cavalry team is their opponent in the first round.

According to the rules, the teams must play two games, one at the Machinegunners' stadium and the other at the Cavalry's stadium. The team that scores more goals in the two games will advance to the next round. If the teams score the same number of goals, then the team that scores more goals at the opponent's stadium will advance. If these numbers are also the same, then the winner will be chosen at random.

The teams have played their first game already. The Machinegunners want to work out an adequate tactics for the return game, and for this they need to know the following two values:

- the minimal number of goals they must score to get a chance to advance to the next round;
- the maximal number of goals they may score which leaves a chance for their opponents to advance to the next round.

It is known that no team can score more than thirty goals in one game.

Input

The input consists of several test cases. The first line contains the number of test cases t ($1 \leqslant t \leqslant 200$). Each of the following t lines describes one test case and contains the result of the first game in the form:

"`The Machinegunners played` *where* `game, scored` x `goals, and conceded` y `goals.`",

where *where* is the string "`home`" or "`away`"; $0 \leqslant x, y \leqslant 30$.

Output

For each of test cases output in a separate line the minimal number of goals necessary to advance to the next round and the maximal number of goals that does not guarantee this.

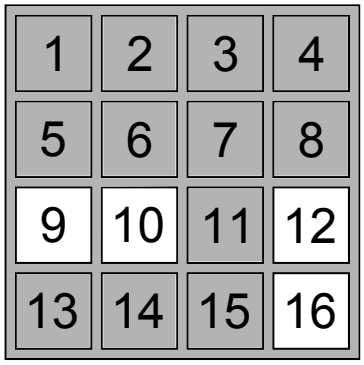
Example

input.txt
2 The Machinegunners played home game, scored 28 goals, and conceded 0 goals. The Machinegunners played home game, scored 1 goals, and conceded 1 goals.
output.txt
0 1 1 29

Problem F. Chapaev and a Cipher Grille

Input file:	`input.txt`
Output file:	`output.txt`
Time limit:	1 second
Memory limit:	64 MB

When searching the Whites' deserted headquarters, Petka and Chapaev found several $n \times n$ squares filled with letters. Chapaev supposed that the Whites were communicating secretly by using a cipher grille and the squares were ciphered messages.



A cipher grille is an $n \times n$ paper square with windows made by cutting out $n^2/4$ cells. Putting the grille on a paper sheet of the same size, the coder writes the first $n^2/4$ symbols of a message in the windows. After that he turns the grille clockwise by 90 degrees. He writes the next $n^2/4$ symbols of the message in the windows and turns the grille by 90 degrees again. Then he writes the following $n^2/4$ symbols, turns the grille one more time, and writes the last $n^2/4$ symbols of the message. Each turn of the grille covers all the symbols written earlier and opens empty cells.

Despite searching the headquarters thoroughly, Petka and Chapaev found no cipher grilles. Evidently, the Whites had destroyed them before leaving the premises. On the next day Anka noticed that there was an integer k written on a wall of the headquarters. She informed Chapaev at once, and he surmised that the Whites had used the kth cipher grille in the lexicographic order. In order to decipher the messages, they had to make such a grille.

Every $n \times n$ cipher grille can be coded as an $n \times n$ matrix consisting of zeros and ones in which ones denote windows and zeros denote other cells. We say that a matrix a is lexicographically smaller that a matrix b (both matrices are of the size $n \times n$) if there exists a number i such that the first i cells of the matrices a and b coincide, the $(i+1)$th cell of the matrix a contains zero, and the $(i+1)$th cell of the matrix b contains one. The cells of matrices are numbered as in the picture.

Input

The only line contains the integers n and k ($4 \leqslant n \leqslant 10$; n is even; $1 \leqslant k \leqslant 10^{18}$). It is guaranteed that k does not exceed the total number of cipher grilles of size $n \times n$.

Output

Output the grille Chapaev had to make in order to read the Whites' messages.

Example

input.txt	output.txt
4 15	0000 0000 1101 0001

Problem G. Mobile Telegraphs

Input file:	input.txt
Output file:	output.txt
Time limit:	3 seconds
Memory limit:	64 MB

Each fighter of the 25th Rifle Division has been given the newest communication device — a mobile telegraph. It can be used for sending telegrams to the command and to fellow fighters right at the battle field. Unfortunately, the design of telegraphs is still far from being perfect, so messages can be sent only between some pairs of telegraphs.

Each device has a unique number, which is a string consisting of ten decimal digits. A message can be sent from a telegraph a to a telegraph b only if the number b can be obtained from the number a by changing exactly one digit or by swapping two digits, and the time of sending a message from the telegraph a to the telegraph b depends on the length of the longest common prefix of their numbers: the longer the common prefix is, the faster the message is sent.

During a battle, Anka noticed from her well-camouflaged position the group of Whites trying to bypass Red Army fighters in the rear. What minimal time is required to deliver this information from Anka to Chapaev by telegraph, using, possibly, telegraphs of other Red Army fighters?

Input

The first line contains the number n of fighters in the division ($2 \leqslant n \leqslant 50\,000$). The second line contains ten integers in the range from 1 to 10 000 separated with a space written in the nonascending order. These are the times of sending a message from one telegraph to another if the length of their common prefix is zero, one, two, ..., nine. The next n lines contain the numbers of telegraphs given to the fighters of the division. The number of Anka's telegraph is described first, and the number of Chapaev's telegraph is described last. All the numbers of telegraphs are different.

Output

Output the only line "-1" if it is impossible to deliver the message to Chapaev. Otherwise, in the first line output the minimal time required to deliver the message. In the second line output the number of fighters in the delivery path, and in the third line output their numbers separated with a space in the order from Anka to Chapaev. The fighters of the 25th Division are numbered from 1 to n in the order in which their mobile telegraphs are described in the input. If there are several ways to deliver the message in minimal time, output any of them.

Examples

input.txt	output.txt
5 100 10 10 10 1 1 1 1 1 1 9123493342 3123493942 9223433942 3223493942 9223433945	211 5 1 2 4 3 5
2 1 1 1 1 1 1 1 1 1 1 0123493342 0223433945	-1

Problem H. Cartridges for Maxim

Input file:	`input.txt`
Output file:	`output.txt`
Time limit:	1 second
Memory limit:	64 MB

During a short break in a hot battle against Kappel's corps, Petka and Chapaev brought boxes with cartridges for the Anka's Maxim gun.

The Red Army men were exhausted because they had carried more than one box with cartridges to the machine gun, and each box contained at least one hundred cartridges. Anka noticed that there was the same number of cartridges in all boxes.

She wanted to put all the cartridges in several pockets so that the greatest common divisor of the numbers of cartridges in her pockets would be as large as possible. Among all the variants of such an arrangement, she wanted to choose the variant in which the least common multiple of the numbers of cartridges in her pockets would be as large as possible too. How could she do it?

Input

The only input line contains the total number n of cartridges Petka and Chapaev brought ($200 \leqslant n \leqslant 10^9$).

Output

The only output line should contain integers a_1, a_2, ..., a_k separated with a space ($2 \leqslant k \leqslant n$), where a_i is the number of cartridges Anka should put in the ith pocket. If there are several answers, output any of them.

Examples

input.txt	output.txt
200	100 100
625	375 250

Problem I. Chapaev at the Planet Ocean

Input file:	`input.txt`
Output file:	`output.txt`
Time limit:	1 second
Memory limit:	64 MB

Anka had a dream in which she and Petka were in the Flat World near a planet called Ocean. This planet was a water disk centered at the origin. Looking at the planet, each of them saw a silhouette of a man in the water. Was it possible that they saw the same man? Could he be Chapaev, who needed their help?

Input

The first line contains two numbers separated with a space. The first number is the radius of the planet Ocean; it is an integer in the range from 1 to 1 000. The second number is the refractive index of the planet Ocean; it is a real number in the range from 1 to 100 with at most two fractional digits. The second line contains Anka's coordinates and the coordinates of the vector along which she looks at the man in the water. The third line contains Petka's coordinates and the coordinates of the vector along which he looks at the man in the water. The numbers in the second and third lines are separated with a space; they are integers with absolute values not exceeding 1 000. It is guaranteed that Petka and Anka are at distinct points outside the planet and the points they see are strictly inside the planet. Petka, Anka, and the men they see inside the planet Ocean must be regarded as points.

Output

Output "`Yes`" if Petka and Anka may see the same man inside the planet and "`No`" otherwise. It is guaranteed that in the case of the answer "`Yes`" the man they see is at a distance of at least 10^{-4} from the boundary of the planet.

Examples

input.txt	output.txt
10 2.0 5 10 0 -1 -5 10 0 -1	Yes
10 1.5 5 10 0 -1 -5 10 0 -1	No

If α is the angle between an incident ray and the normal vector to the surface at the incidence point and β is the angle between the refracted ray and the normal vector to the surface, then the refractive index equals $\sin\alpha / \sin\beta$.

Problem J. Chapaev and Potatoes

Input file:	input.txt
Output file:	output.txt
Time limit:	1 second
Memory limit:	64 MB

Anka and Petka were waiting for Chapaev and eating potatoes. Soon they were full and decided to play the "Chapaev" game using the remaining four potatoes.

Petka took a 20×20 board, put the potatoes on it, and declared the following rules. No two potatoes could lie on the same square, and a player could shoot at a potato and knock it off the board with another potato only if the potatoes were in the same vertical or horizontal line and there were no other potatoes between them.

Anka suggested to take some potatoes and put them on unoccupied squares of the board so that each potato could be used to shoot at exactly one another potato. Help Petka do this by changing the positions of as few potatoes as possible.

Input

The four input lines contain the coordinates x_i, y_i of the potatoes. The coordinates are integers in the range from 1 to 20. No two potatoes are on the same square.

Output

Output the new coordinates of the potatoes. The potatoes must be described in the same order as in the input. If there are several answers, output any of them.

Example

input.txt	output.txt
1 1 2 2 4 4 4 3	1 2 2 2 4 4 4 3