1. Evaluate Expression

In an internal software created by IIT Jammu, the access to services can only be accessed if the expression, shown on screen on login, is evaluated correctly. It was internally communicated to all the stakeholders that the actual expression will be of the form:

X = n1^pow1 + n2^pow2 + ... + nN^powN, where n1, n2 to nN are integers and pow1, pow2 to powN are one digit integers.

The expression shown on the screen will be a bit different from the actual expression. The expression on the screen will be of the form:

X = A1 + A2 + …. + AN, where A1, A2 to AN are integers.

For example, if the expression on the screen is of the form: X = 212 + 1253, then the actual expression will be of the form: X = 21^2+ 125^3 (since the last digit of each addend in expression screen will go to power in actual expression).
All the stakeholders knew that expression on the screen has to be evaluated as an actual expression always to get access. This became a big task to do for everybody. Therefore, the authorities want you to read the expression on screen and evaluate it as an actual expression. Can you complete this task?
Note: a^N is read as “a raised to power N” and a^N = a · a · ... · a (N times).

Input Format:

The first line of input contains the integer N, the number of the numbers to be added from the expression on screen.
Each of the following N lines contains the integer Ai, that represents a number from expression on screen.

Constraints:

1 ≤ N ≤ 10
10 ≤ Ai ≤ 9999 (for i = 1,2,. . . . N)
Time limit : 1 sec

Output Format:

The first and only line of output should contain the value of expression on screen, evaluated as actual expression, as described in the task.

Sample Input 1:

3
202
1253
12

Sample Output 1:

1953526

Explanation:

The actual expression evaluated will be as follows: 20^2 + 125^3 + 1^2 = 400 + 1953125 + 1 = 1953526.

2. Bob and his string

King Bob is in playful mood today. He started playing with string S. As he was playing, a weird question came in his mind. He wondered what is the maximum number of characters, between any two same characters in the string. He needs your help in solving this question. Can you help him solve this question?

Note: String S is composed of lowercase letters of the Latin alphabet. If there are no two same characters in the string, print -1.

Input Format:

The first line of input contains one integer T, denoting the number of test cases.

Each of the next T line contains one string S.

Constraints:

1 < T < 10

1 < |S| < 100000, where S determines the length of the string.

String is composed of lowercase alphabets ranging from a to z.

Time limit : 1 sec

Output Format:

For each test case, output the maximum number of characters between any two same characters in the string. If there are no two same characters in the string, print -1.

Print answer for each test case in a new line.

Sample Input 1:

2

aba

babcddc

Sample Output 1:

1

2

Explanation:

1) For string = aba

There is only one character between 2 occurrences of a.

2) For string = babcddc

There is one character between 2 occurrences of b, and 2 characters between 2 occurrences of c. So the answer is 2.

3. Mushrooms

Mukesh and Suresh love pizzas. They brought a pizza and decided to divide it equally among themselves. The pizza was cut into eight slices. Mukesh is the one who will split the pizza into two equal halves, such that each of them gets a complete "half circle" of pizza or four consecutive slices of pizza. Moreover, the pizza had mushrooms on it. Suresh requested Mukesh to divide in such a way that his 4 slices have maximum number of mushrooms on them.

Can you help Mukesh in finding 4 consecutive slices with maximum mushrooms. You just have to tell the maximum mushroom count that Suresh can get.

Input Format:

Each of the eight lines of input contains the integer Si. These numbers are, respectively, the amount of mushrooms on pizza slices, where the slices are given in clockwise order.

Constraints:

$2 \leq |Si| \leq 50$, $i=1,2,3,.....,8$

Time limit : 1 sec

Output Format:

The first and only line of output must contain the required number.

Sample Input 1:

5

2

1

4

5

1

2

3

Sample Output 1:

12

Explanation for Sample Output 1:

The four consecutive slices that would be taken to get the maximum number of mushrooms are the first four slices listed, i.e. 5, 2, 1, and 4. So the total number of mushrooms are 5 + 2 + 1 + 4 = 12

Sample Input 2:

2

6

5

3

3

7

2

6

Sample Output 2:

19

Explanation for Sample Output 2:

The four consecutive slices that would be taken to get the maximum number of mushrooms are the first three and the last slice listed, i.e. 2, 6, 5, and 6. So the total number of mushrooms are 2 + 6 + 5 + 6 = 19

4. F7 Championship

The fictional World Championship of Formula 7 Drivers 2019 was characterized by exciting races and frequent shifts of driver positions on the leaderboard. Pradeep has missed most of it because he was training for olympiads in informatics. Now, looking at the leaderboard, Pradeep has a simple question for you: "How many drivers participating in this Championship still had a chance to become Formula 7 World

Champion at the start of the final race?" The World Champion is, of course, the driver with the largest point total at the end (after the final race).

There are N drivers participating in the Championship. They are all assigned points after each race, including the final one. The winner of the race is awarded N points, the runner-up gets N - 1 points, and so on until the last driver, who gets 1 point. Two drivers cannot finish a race in the same spot.

Write a program to calculate, based on the total number of points that each driver has earned before the final race, how many drivers still have a chance to have the largest total after the final race and thus win the Championship. If more than one driver has the same maximum point total, they are all awarded the World Champion title

Input Format:

The first line of input contains the positive integer N, the number of drivers participating in the Championship.

Each of the following N lines contains a single integer Bi, the number of points that a driver has before the final race.

Constraints:

$3 \leq N \leq 300000$

$0 \leq Bi \leq 2000000$ (i = 1, ..., N)

Output Format:

The first and only line of output should contain the requested number of drivers that can still win

Sample Input 1:

3

8

10

9

Sample Output 1:

3

Sample Input 2:

5

15

14

15

12

14

Sample Output 2:

4

5. Even Jumps

Little Mayur and his grandmother are learning mathematics. His grandmother has N blocks. Each block has a shape of cube and a number is written on top of it. She keeps his pet frog, Tony, at the first block. Tony can jump two blocks at a time, such that if it is at 1st block, it can jump to 3rd block and from 3rd block to 5th block and so on.
Grandmother wants Mayur to find sum of numbers on all the blocks that Tony has landed. Can you help Mayur find the sum.

Input Format:

The first line of input contains an integer, that denotes the value of N. The following line contains N space separated integers.

Output Format:

The first and only line of output contains the sum of numbers on all the blocks that Tony has landed.

Constraints:

N lies in the range: [1, 100]

Value of numbers on blocks lies in the range: [1, 10000]

Sample Input 1

5

1 2 3 4 5

Sample Output 1

9

Explanation

Tony will land on blocks with numbers 1, 3 and 5 and hence the sum is 9.

6. Maths homework

Ayush's newest math homework assignment is a very difficult one! Given a sequence, V, of N integers, remove exactly K of them from the sequence. Let M be the largest difference of any two remaining numbers in the sequence, and m the smallest such difference. Select the K integers to be removed from V in such a way that the sum M + m is the smallest possible. Ayush isn't very good at math, so he has asked you to help him!

Input Format:

The first line of input contains two positive integers, N and K.
The second line of input contains N space-separated integers – the sequence V.

Constraints:

3 ≤ N ≤ 1000000
1 ≤ K ≤ N-2

-5000000 ≤ Vi ≤ 5000000
Time limit: 1 sec

Output Format:
The first and only line of output must contain the smallest possible sum M + m.

Sample Input 1:
5 2
-3 -2 3 8 6

Sample Output 1:
7

Sample Input 1:
6 2
-5 8 10 1 13 -1

Sample Output 2:

13

7. Strange island
A popular tourist destination country is situated on a breathtakingly beautiful archipelago constantly bathed by the sun. The country's residents are very proud of their numerous islands. However, global warming has them very worried: raising sea levels are resulting in rapidly increasing loss of dry land, which is diminishing the beauty of the archipelago.
The map of the archipelago is represented by a grid of R by C squares (characters). The character 'X' (uppercase letter x) represents dry land, while '.' (period) represents sea. It has been estimated that, in fifty years, sea will have flooded every square of land that is currently surrounded by sea on three or on all four sides (north, south, east, west). Assume that all squares outside the map (along the edges) are covered by sea.
Your task is computing the map of the archipelago in fifty years (after the described sea level rise).

Since there will probably be less land than today, you shouldn't print out the whole map, but only its smallest rectangular part that contains all land squares. It is guaranteed that at least one square of land will remain in all test cases.

Input Format:
The first line of input contains two positive integers, R and C, the dimensions of the current map.
Each of the following R lines contains C characters. These R by C characters represent the current map of the archipelago.

Constraints:
1 ≤ R, C ≤ 10
Time limit: 1 sec

Output Format:
The output must contain an appropriate number of lines representing the required rectangular part of the future (flooded) map.

Sample Input 1:
```
5 3
...
.X.
.X.
.X.
...
```

Sample Output 1:
```
X
```

Sample Input 2:
```
3 10
..........
..XXX.XXX.
XXX.......
```

Sample Output 2:
```
.XX...X
```

XX.....

8. Find the sequenceA A!

Once upon a time, there existed a sequence A consisting of N positive integers. You don't know the sequence itself, but you do know the sum of every two elements of the sequence. Find the sequence A!

Input Format:

The first line of input contains the positive integer N (2 ≤ N ≤ 1000).
Each of the following N lines contains N positive integers smaller than or equal to 100 000, forming the table S. The following relations hold: S(i, j) = A[i] + A[j] for i ≠ j, and S(i, j) = 0 for i = j. Here S(i,j) denotes the number in the ith row and jth column of the table, and A[i] denotes the ith element of the sequence A. It is guaranteed that for any input data set there exists a unique sequence of positive integers A with the given properties.

Output Format:

The first and only line of output must contain the required sequence A (in the form of N spaceseparated positive integers).

Sample Input 1:

```
2
0 2
2 0
```

Sample Output 1:

```
1 1
```

Sample Input 2:

```
4
0 3 6 7
3 0 5 6
6 5 0 9
7 6 9 0
```

Sample Output 2:

```
2 1 4 5
```

9. Shortest racing track

Ankit and Ayush are the only two contestants at the Grand Prix of Racing which is driven through nearby villages. The villages are connected via one-way roads, and for each road i we know Mi and Si, the time necessary for Ankit and Ayush to cross that road. The race itself is circular (meaning it starts and begins in the same village), but the route itself hasn't been determined yet.
Ankit has bribed the organisers of the race so they'd pick a route in his favour. Specifically, the organisers are going to pick the shortest route (containing the minimal number of roads) such that Ankit is strictly faster than Ayush on that route. If, by any chance, there are several such routes, the organisers choose the one where Ankit gains maximal advantage.

Input Format:

The first line of input contains two integers N, M, the number of villages and the number of connecting roads.

Each of the following M lines contains 4 integers Ai, Bi, Mi, Si. Respectively, the initial and ending village of the ith road, the time necessary for Ankit and the time necessary for Ayush to cross that road. There won't exist two different roads that connect the same pair of villages in the same direction.

Constraints:

$2 \leq N \leq 300$

$2 \leq M \leq N(N-1)$

$1 \leq Ai, Bi \leq N, Ai \neq Bi,$

$0 \leq Si, Mi \leq 106$

Time limit = 5 sec

Output Format:

The first and only line of output must contain two integers: the shortest possible route (with the minimal number of roads) such that Mirko wins, and the maximal advantage Mirko can gain on a route of the shortest length.

Please note: The input data will be such that a route which meets the conditions from the text will always exist.

Sample Input 1:

3 4

1 2 3 0

2 3 3 0

3 1 0 100

2 1 0 4

Sample Output 1:

2 1

Sample Input 2:

5 7

1 2 4 1

2 3 5 1

3 1 1 6

1 3 15 5

2 4 7 5

4 5 1 4

5 3 1 0

Sample Output 2:

5 2

10. Gennady and his explosion string

Gennady likes to play with strings of characters, but this time he has taken it too far – he put an "explosion" in the string! An explosion is a series of characters which, if found in the vicinity of fire,explodes and starts a chain reaction.

Gennady, being as negligent as he usually is, forgot that his string contained an explosion and placed it near a candlelight. Thus the chain reaction began.

The chain reaction takes place in the following way:

• if a string contains explosions, they all explode and a new string is formed by concatenating the pieces without the exploding parts
• this concatenation could possibly create new explosions
• the chain reaction repeats while there are explosions in the string

Now Gennady wants to know whether anything will be left after this series of chain reactions. If nothing remains, output "FRULA" (without quotes). If, by any chance, something is left, output the final string remaining after all the reactions.

Please note: The explosion will not contain two equal characters.

Input Format:

The first line of input contains Gennady's string.
The second line of input contains the explosion string.
Both Gennady's string and the explosion string consist of uppercase and lowercase letters of the English alphabet and digits 0, 1, … 9.

Constraints:

1 ≤ |Gennady's string| ≤ 1000000
1 ≤ |explosion string| ≤ 36
Time limit = 1 sec

Output Format:

The first and only line of output must contain the final string remaining after all the reactions as stated in the task.

Sample Input 1:

mirkovC4nizCC44
C4

Sample Output 1:
mirkovniz

Sample Input 2:
12ab112ab2ab
12ab

Sample Output 2:
FRULA

Explanation:
For testcase 2:

Firstly, the bombs on positions 1 and 6 explode. Then we are left with ****1****2ab (where * marks the character that exploded) and when that string is put together, we get 12ab. Sadly, that is an explosion all over again so it disappears.

11. Pattern in directories

In his spare time, One of our ninja Sushant likes to browse through files in directories. Unfortunately, it seems to him that the console on his computer broke down and now it doesn't correctly print file names that match a certain pattern.

A pattern is string consisting of lowercase letters of the English alphabet and exactly one asterisk.A file name matches a pattern if the pattern string can be made equal to the file name by replacing the asterisk with an arbitrary string of lowercase letters of the English alphabet (an empty string substitution is also possible). For example, strings “abcd”, “ad” and “anestonestod” all match the pattern “a*d” and the string “bcd” does not.

Write a programme that will, given a pattern and file names, output whether a file name matches the pattern or not.

Input Format:

The first line of input contains the integer N, the number of files.

The second line of input contains a string Str, of characters consisting of only lowercase letter of the English alphabet and exactly one asterisk (ASCII value 42).

Each of the following N lines contains file names Si, each in its own line. The file names consist of only lowercase letters of the English alphabet and their length will not exceed 100.

Constraints:

1 ≤ N ≤ 100

1 ≤ |Str| ≤ 100

1 ≤ |Si| ≤ 100

Time limit = 1 sec

Output Format:

Output N lines. The ith line should be “YES” if the ith file name matches the pattern or “NO” (Croatian for no) if the ith file name does not match the pattern.

Sample Input 1:

3

a*d

abcd

anestonestod

facebook

Sample Output 1:

YES

YES

NO

Sample Input 2:

6

h*n

huhovdjestvarnomozedocisvastan

honijezakon

atila

je

bio

hun

Sample Output 2:

YES

YES

NO

NO

NO

YES

12. Piles of bricks

Nick and John are playing with bricks. Both of them have their own pile of bricks. The piles consist of N columns (where N is an odd number). The number of bricks in the ith column of Nick's pile is labeled with mi and john's pile with si.

They have decided to create two equal piles constructed in a way that the heights of columns are strictly descending at first and then strictly ascending and the heights of adjacent columns differ exactly by 1. The lowest of the columns must have an equal number of columns to the left and to the right of it.

The piles can be modified by removing one brick from the top of some column and throw it out the window (they cannot reuse it) or by taking one brick from the box and place it on the top of some column (there is an infinite amount of bricks in the box). Removing or placing a brick counts as one move.
You have to determine the minimal number of moves so that Nick and John can rearrange their piles in the described way.

Input Format:
The first line of input contains an odd number N, the number of columns in both piles.
The second line of input contains N integers mi, column heights in Nick's pile.
The third line of input contains N integers si, column heights in john's pile.

Constraints:
1 ≤ N ≤ 300000
0 ≤ mi ≤ 10^12
0 ≤ si ≤ 10^12
Time limit = 1 sec

Output Format:
The first and only line of output must contain the minimal number of moves.

Sample Input 1:
3
1 2 3
3 2 2

Sample Output 1:
3

Sample Input 2:
5
2 3 0 1 4
3 3 2 3 1

Sample Output 2:
10

Explanation:

For testcase 1:

Nick places two bricks on the top the first column in his pile and john places one brick on the top of the third column in his pile.

13. Hash Function

Little Ninja is studying the hash function which associates numerical values to words. The function is defined recursively in the following way:

• f(empty word) = 0

• f(word + letter) = ((f(word) * 33) XOR ord(letter)) % MOD

The function is defined for words that consist of only lowercase letters of the English alphabet. XOR stands for the bitwise XOR operator (i.e. 0110 XOR 1010 = 1100), ord(letter) stands for the ordinal number of the letter in the alphabet (ord(a) = 1, ord(z) = 26) and A % B stands for the remainder of the number A when performing integer division with the number B. MOD will be an integer of the form 2^M.

Some values of the hash function when M = 10:

• f(a) = 1

• f (aa) = 32

• f (kit) = 438

Ninja wants to find out how many words of the length N there are with the hash value K. Write a programme to help him calculate this number.

Input Format:

The first line of input contains three integers N, K and M.

Constraints:

1 ≤ N ≤ 10
0 ≤ K < pow(2,M)
6 ≤ M ≤ 25
Time limit = 1 sec

Output Format:

The first and only line of output must consist of the required number from the task.

Sample Input 1:

1 0 10

Sample Output 1:
0

Sample Input 2:
3 16 10

Sample Output 2:
4

Explanation:
For testcase 1:
None of the characters in the
alphabet has an ord value 0.
For testcase 2:

Those are the words “dxl”, “hph”, “lxd” and “xpx”.

14. Students

The annual student team competition in table tennis of students enrolled in University of Delhi takes place next Saturday! Each team consists of K students. The excited students, N of them, are waiting in queue to register.

Ishank works at the registration desk. He doesn’t really feel like doing his job so he decided not to allow students to choose a team. He decided that the first team will consist of the first K students standing in queue, the second team the following K students, the third one the following K students and so on. . . (N will be divisible by K so nobody is left hanging.)

Navdeep has estimated the skill of each player with an integer. He would like to have the K strongest players in the first team, the following K strongest in the second team and so on. . .

Ishank has just taken a break and Navdeep decided to shift the students standing in queue so that he achieves his goal. The way he shifts them is that he tells a student to step out of the queue and go back in queue after another student or to go to the front of the queue. It takes him one minute to do this.

It’s possible that Ishank is going to return from his break any moment so Navdeep needs to achieve his goal as soon as possible. Help Navdeep determine the minimal number of minutes necessary for him to achieve his goal.

Input Format:
The first line of input contains the integers N and K. The integer N is going to divisible by K.

The second line contains N space separated integers vi), ith number denotes the skill of the ith player standing in queue.
All contestants are going to have distinct levels of skill.

Constraints:
2 ≤ N ≤ 5000
2 ≤ K ≤ 5000
1 ≤ vi < 1000000000
Time limit = 1 sec

Output Format:
On the first line, print the maximum number of topics a 2-person team can know.
On the second line, print the number of ways to form a 2-person team that knows the maximum number of topics.

Sample Input 1:
4 1
9 12 5 13

Sample Output 1:
1

Sample Input 2:
6 3
7 9 8 3 6 5

Sample Output 2:
3

Explanation:
For testcase 2:
Navdeep should move the students with skill levels 5, 6 and 3 to the front of the queue.

It takes him three minutes to do that.

15. Minimum number of additions to cover all

In a special batch of N students, which focuses on competitive programming. There are M teaching assistants and the N students are sitting in a linear arrangement of chairs. The chairs are numbered 1 to N, from left to right. The TAs are standing behind M distinct chairs. It is given that if a TA is standing behind chair numbered X, then TA can handle doubts of students on chairs numbered X-K to X+K.
Going by this info, it is obvious that some students may enjoy support from more than one TA and there may be some students who have not been assigned to any TA.
Your task is to find minimum number of TAs to be added, so that each student gets support of at least one TA.

Input Format:

The first line of input contains a single integer, that denotes the value of N (1 <= N <= 1000).

The following line of input contains another integer, that denotes the value of M (1 <= M <= N).

The following line of input contains another integer, that denotes the value of K (0 <= K <= N).

Each of the following M lines contains an integer, that denotes the number of chair, behind which a particular TA is standing. These numbers represent the positions of TAs and are sorted in ascending order. The numbers will be distinct and will lie in the range: [1, N].

Constraints:

Time Limit: 1 second

Output Format:

Print the minimum number of TAs that needs to be added, as described in the task.

Sample Input 1:

5

2

2

1

5

Sample Output 1:

0

Explanation:

As all the students are covered by present lot of TAs, therefore, no more TAs needs to be added.

16. Choosing the right candidate

The king is looking for chief advisor. The judges panel, consists of judges from region's supreme court. There are M candidates, labelled from 1 to M. Each of the judge will select exactly one candidate. The judge will publish its own rank-list of candidates, that is a permutation of labels 1 to M. The candidate with most number of selections is the winner. If two or more candidates are selected by most number of judges, then the candidate with smallest label is preferred.
For example, let's say there are four candidates and one of the judges rank-list is: 2, 1, 4, 3. This means the judge has selected candidate with label 2. If the candidate with label 2 gives up the candidacy, then candidate with label 1 will be selected by this particular judge.
You are given rank-list of each judge and your task is to find the winner candidate's label. You have another task. You are given a label K. You have to find minimum number of candidates, who have to give up candidacy, so that candidate with label K wins.

Input Format:

The first line of input contains integers N (1 <= N <= 100), M (1 <= M <= 15) and K (1 <= K <= M). Each of the following N lines contain rank-list of each judge, which is a permutation of first M natural numbers.

Constraints:

Time Limit: 3 seconds

Output Format:

Print the winner candidate's label in first line. In the next line, print the minimum number of candidates, who have to give up candidacy, so that candidate with label K wins.

Sample Input 1:

3 4 1

3 4 1 2

4 2 3 1

3 4 2 1

Sample Output 1:

3

3

Explanation:

If neither of the candidates give up their candidacy, then label 3 candidate will win. To make label 4 candidate win, all the other candidates have to give up their candidacy.

17. Human Vs Computer

Anjali makes mistakes in evaluating multiple choice single correct type questions. To check her error percentage, each answer sheet that she evaluates was also evaluated by computer. The dual evaluation system was adopted for Half Yearly Exams, at Coding Ninjas. Now, each student has two types of progress card: one prepared by Anjali and other prepared by computer.

For each student, the error percentage of Anjali is defined by the expression: (ratio of number of subjects for which total marks evaluated by her is same as that of computer to total number subjects) * 100.

The task for you is as follows. You will be given two lists. One of the lists has scores given by Anjali and other by computer. We have purposefully replaced some scores by variables. You can replace the variable by any integer. You have to tell whether it is possible for the student, to have same scores in both of lists, for each subject. In other words, you have to tell whether it is possible to for Anjali have zero error percentage.

Note: It is given that all the problems in the exam are of the type: single correct and multiple choice.

Input Format:

The first line of input contains a positive integer, that denotes the number of subjects that a particularly student has. Let it be represented by N (1 <= N <= 50000).

The following line contains N space separated values for the first list.

The following line contains N space separated values for the second list.

Each value in the lists can be either an integer or a string. The integer will be a positive integer less than 1000. String will be a sequence of lowercase characters of English alphabet (no longer than 10 characters).

Constraints:

Time Limit: 1 second

Output Format:

The first and only line of output contains 'true', if it is possible for Anjali to achieve zero error percentage and 'false' otherwise.

Sample Input 1:

5

a 3 a b 3

a b 2 c 3

Sample Output 1:

true

Explanation:

Both the lists will become equal for the values of a=2, b=c=3.

18. Badminton Game

Vikas and Navdeep are playing a modified badminton game. This badminton game is time bound and is of 48 minutes. Both of them are working hard to win the match. Naman is watching the game and has to answer these two queries:

1. How many points were scored in first half?

2. How many times a player came from a losing situation (has strictly fewer points scored than the other player) to a leading position one (has strictly more points scored than other player)?

Since, Naman is busy watching the game, he wants your help.

Input Format:

The first line of input consists of number of points scored by Vikas in the entire game. Let it be denoted by symbol V (1 <= V <= 3000). Each of the following V lines consists of an integer, the seconds in which Vikas has scored points, ordered from smallest to largest. Each of second lies in the range: [1, 2880]. The following line consists of number of points scored by Navdeep. Let us denote it by symbol N (1 <= N <= 3000). Each of the following N lines consists of an integer, the seconds in which Navdeep has scored points, ordered from smallest to largest. Each of second lies in the range: [1, 2880].

Constraints:

Time Limit: 1 second

Output Format:

The first line of output contains an integer, which answers first query. The following line of output contains an integer, which answers second query.

Sample Input 1:

6

15

30

35

55

60

2065

7

20

25

40

45

50

2070

2075

Sample Output 1:

10

5

19. Catch Brackets

At Coding Ninjas, we love to play games. We all are fond of a game called Catch Brackets.

Game Description: Let us say that screen is divided into 'row' * 'col' number of pixels. The main character is kept at a pixel on the bottom most row. The position of main character is denoted by character 'M'. The main character can move one pixel left or right or stay still. This means it is not necessary to move the main character.

It is given that all the other pixels of the game (except the last row) are filled by either one of these elements: '(' (opening bracket), ')' (closing brackets), '.' (empty pixel), '*' (landmines). Except the last row, all the other rows simultaneously move one pixel down and eventually move out of the screen.

While each row is moving out, the main character want to move and catch brackets. The caught bracket gets added to its array. The objective of the main character is to make longest array of balanced brackets. The game becomes over when either main character catches a landmine or all the rows move out of the screen.
An array or sequence of balanced brackets is defined as follows:

1. () is a sequence of balanced brackets.

2. If p is a sequence of balanced brackets, then (p) is also a sequence of balanced brackets.

3. If p and q are sequences of balanced brackets, then pq is also a sequence of balanced bracket.

Your task is to find the longest possible array of balanced brackets.

Input format:

The first line of input contains two space separated integers, that denote the values of 'row' and 'col'. The value of 'row' and 'col' lies in the range: [1, 300]. Each of following 'row' number of lines contains 'col' number of space separated characters. Characters can be '.', '(', ')', '*' or 'M'.

The test cases would be such that at least one array of balanced brackets is possible to catch.

Constraints:

Time Limit: 0.5 seconds

Output Format:

The first line of output contains the length of longest array or sequence of balanced brackets.

The following line contains the array itself. If there are multiple answers, output the lexicographically smallest one.

Sample Input 1:

5 4

.)..

*.((

.).*

(.((

.M..

Sample Output 1:

4

()()

20. Get all subarrays that can generate P

A sequence of integers N1, N2, N3, ... Nm. This sequence can generate an integer P, only if it is possible to find another sequence of integers: O1, O2, O3 .... Om such that:

Equation (1) -> O1 * N1 + O2 * N2 + ... Om * Nm = P

For this problem, you are given a sequence of n integers, T1, T2, T3, T4 ... Tn, and on this sequence, you are asked x queries. In each query, you are given an integer P, the solution to each query is count of all subarrays (each subarray is defined by indices [i, j], where i and j are inclusive) such that the integers in the subarray T[i], T[i+1] .... T[j] generates P, according to the equation 1.

Input Format:

The first line of input contains a single integer, that denotes the value of n. The value of n lies in the range: [1, 100000]. The following line of input contains n space separated integers. The value of each integer lies in the range [1, 1000000000]. The following line of input contains number of queries, that denotes the value of x. The value of x lies in the range [1, 100000]. The following x lines, contain a single integer P. The value P lies in the range [1, 1000000].

Constraints:

Time Limit: 1 second

Output format:

There are x lines of output in each query. For each of the x lines, print the count of subarrays that generate P.

Sample Input 1:

4

2 4 3 6

3

1

2

3

Sample Output 1:

4

6

6

Explanation:

For the first query, the four subarrays are: [4,3], [2, 4, 3], [4, 3, 6], [2, 4, 3, 6].

For the second query, the six subarrays are: [4,3], [2, 4, 3], [4, 3, 6], [2, 4, 3, 6], [2], [2, 4].

For the first query, the four subarrays are: [4,3], [2, 4, 3], [4, 3, 6], [2, 4, 3, 6], [3], [3, 6].

21. Complete Tasks!

Anish is handling a project for his company. He has N employees and wants to complete as much work as possible today. However, he also has to maintain some work ethics and rules of the company.
The rule states that an equal amount of work must be given to all the employees who are at work.
Also, the work given to the ith person must not exceed the LIMIT[i].
So, what Anish can do is to call a continuous subset of people in the office and assign them tasks maintaining the above conditions. What is the maximum number of tasks Anish can complete today?

Example:-

Let,

N = 5

LIMIT :- [1,2,3,2,1]

The answer should be 6 because Anish can choose 2nd, 3rd, and 4th person and assign them 2 tasks each, so he can complete 6 tasks today.

Input Format :

The first line contains a single integer ‘T’ representing the number of test cases. Then each test case follows.

The first line of each test case contains an integer ‘N’ denoting the number of employees.

The next line contains ‘N’ integers denoting LIMIT[i] representing the work limit of the ith employee.

Output Format :

For each test case, return the maximum number of tasks that can be completed today.

The output of each test case should be printed in a separate line.

Note :

You are not required to print anything, it has already been taken care of. Just implement the function.

Constraints :

1 <= T <= 5

1 <= N <= 10^5

1 <= LIMIT[i] <= 10^6

Time Limit: 1 sec

Sample Input 1 :

2

5

1 2 3 2 1

4

2 2 2 2

Sample Output 1 :

6

8

Explanation for Sample Output 1 :

In the first test case, Anish can choose 2nd, 3rd, and 4th person and assign them 2 tasks each, so he can complete 6 tasks today.

In the second test case, Anish can call all the employees and assign them 2 tasks each, so the total number of tasks is 8.

Sample Input 2 :

1

3

1 2 1

Sample Output 2 :

3

22. Can it be reconstructed?

Coding Ninjas has given you N * N matrix. We have blocked some fields in the square and some fields are blank. We viewed the square from top, left, right and down. First, we viewed it from left and for each of N rows, we wrote a number. This number denotes the number of blank fields in the row before first blocked field. We would write -1, if the first block is blocked in the row. This process was repeated for each side. Hence, we had gathered 4*N numbers.
Parikh, the miscreant came and destroyed the square. We are only left with 4*N numbers. You have to tell us that if it is possible to reconstruct the square?

Input Format:

The first line of input contains a positive integer, that denotes the value of N (1 <= N <= 100000).

The following line contains N integers formed by viewing square from left side, L[i], (-1 <= L[i] <= N).

The following line contains N integers formed by viewing square from right side, R[i], (-1 <= R[i] <= N).

The following line contains N integers formed by viewing square from top side, T[i], (-1 <= T[i] <= N).

The following line contains N integers formed by viewing square from bottom side, B[i], (-1 <= B[i] <= N).

Constraints:

Time Limit: 1 second

Output format:

Print true if it possible to reconstruct the square and false otherwise.

Sample Input 1:

3

-1 2 0

-1 0 1

2 2 1

0 0 1

Sample Output 1:

true

23. Rahul and Strings

Rahul likes equality. One day his professor gave him two Strings, A and B, he want to make them equal. But Rahul is little busy in studying, so he want your help in determining if it's possible to make A equal to B using the following operations. If so, print 1 on a new line. Otherwise, print 0.
You can perform the following operations on the string, :
1) You can convert zero or more of A's lowercase letters to uppercase.
2) You can remove all of the remaining lowercase letters in string A.
For example, given A=AbcDE and B=ABDE, in A we can convert b and delete c to match B. If A=AbcDE and b=AD, matching is not possible because capital letters can not be deleted.

Input Format:

The first line contains a single integer q, the number of queries.

Each of the next q pairs of lines is as follows:

- The first line of each query contains a single string, A.

- The second line of each query contains a single string, B.

Constraints

1<=q<=10

1<|a|,|b|<=1000

String A consists only of uppercase and lowercase English letters, ascii[A-Z,a-z].

String B consists only of uppercase English letters, ascii[A-Z].

Output Format:

For each query, print 1 on a new line if it's possible to make string A equal to string B. Otherwise, print 0.

Sample Input:

1

sdEGgGb

SEGGB

Sample Output:

1

Explanation:

We have A=sdEGgGb and B=SEGGB. We perform the following operation:

1)Capitalize the letters s and b in A so that A=SdEGgGB.

2)Delete all the remaining lowercase letters in A so that A=SEGGB.

Because we were able to successfully convert A to B, we print 1 on a new line.

24. Jessa and her array

Walter is out of town, and Jessa is alone at the office. She was bored, so she took a piece of paper and wrote down a sequence A of length N, which contains each positive integer between 1 and N, inclusive, exactly once. After that, she took another piece of paper and wrote down M descriptions of the sequence A.

Each description has one of the following formats:

If the maximum number in positions between x and y (inclusive) equals v, then it would be written in following format:1 x y v

If the smallest or minimum number in positions between x and y (inclusive) equals v, then it would be written in following format: 2 x y v.

Then Walter came, saw, and stole the first paper. Jessa is desperate and has asked you to find some sequence matching the descriptions, not necessarily equal to the original sequence.

Note:If multiple solution exist, you can print any.

Input Format:

The first line of input contains two positive integers N, the length of the sequence, and M, the number of descriptions.

Each of the following M lines contains a description as described above.

Constraints:

1 ≤ N ≤ 200

0 ≤ M ≤ 40000

Output Format:

The first and only line of output must contain a sequence of N space-separated positive integers (matching the descriptions and containing all positive integers from 1 to N), or -1 if no such sequence exists.

Sample Input1:

3 2

1 1 1 1

2 2 2 2

Sample Output1:

1 2 3

Sample Input2:

4 2

1 1 1 1

2 3 4 1

Sample Output2:

-1

25. Miscreants on the run

The college authorities is fed up of a few miscreants. They are running away from the authorities. The college authorities wants to catch them on run. They are developing a computer system, which will help them catch these miscreants.

The college is made up N blocks, numbered from 1 to N, and E stairs connecting them. Looking at map of college, they want to determine where to keep the stair blocks. The computer system has to answer queries:

1. Given two blocks, A and B, and one stair connecting blocks P and Q. The system has to answer whether the miscreants can get from A to B if the given stair is closed and they can't use it.

2. Given three blocks, A, B and C. Can the miscreants can get from block A to block B, it they can't use or enter block C.

You have to implement such system.

Input Format:

The first line of input contains contains two integers N and E (1 <= N <= 100000 and 1<= E <= 500000), that denote the value of number of blocks and stairs.

Each of the following E lines contain two distinct integers between 1 and N - numbers of two blocks connected by a stair. There will be at most one stair between any pair of blocks.

The following Q lines contains queries (1 <= Q <= 300000). Each of the queries contain four or five integers. The first of these integers is the type of query - 1 or 2. If the query is of type 1, then same line contains four more integers: A, B, P and Q. A and B will represent different blocks and P and Q will be an existing stair.

If the query is of type 2, then the same line contains three more integers: A, B and C. A, B and C will be distinct integers.

The test cases will be such that it is initially possible to go from each block to every other block.

Constraints:

Time Limit: 3 seconds

Output format:

For each query, output the answers, one per line. The answer to a query can be "yes" or "no"

Sample Input 1:

13 15

1 2

2 3

3 5

2 4

4 6

2 6

1 4

1 7

7 8

7 9

7 10

8 11

8 12

9 12

12 13

5

1 5 13 1 2

1 6 2 1 4

1 13 6 7 8

2 13 6 7

2 13 6 8

Sample Output 1:

yes

yes

yes

no

yes

26. Ninja Permutation

It is test time at the NINJA DOJO, and your Sensei, “The Ultimate Ninja Ankush”, really likes Ninja Permutations.

You are given ‘N’ non-negative integers in an array 'A'. Your task is to return the number of Ninja permutations of the array of ‘N’ integers. More formally, An array is called a Ninja array if the sum of every pair of adjacent elements is a perfect square.
Your task is to count the number of ‘Ninja’ permutations of the array.
Example

A = [6,3,13] is a Ninja array as 6+3=9 i.e. 3^2 , 3+13=16 i.e. 4^2.

Two permutations A1 and A2, are different from each other if there exist an index i such that A1[i] != A2[i].
Example:

[6,3,13] and [6,13,3] are different permutations.

Input format

The first line contains an integer ‘N’, representing the array’s size.

The second contains 'N' space-separated integers, denoting the elements of the array.

Output format

For each test case, return an integer denoting the number of Ninja Permutation of array ARR.

Note:

You don’t need to print anything or take input; it already has been taken care of. Just implement the function.

Constraints:-

1 <= N <= 12

0 <= A[i] <= 10^4

where, 0 <= i < N

Time limit: 1 sec

Sample input 1

3

2 14 11

Sample output 1

2

Sample input explanation

Different Ninja permutations of [2, 14, 11] are: [2,14,11] (2 + 14 = 16, 14 + 11 = 25) and [11,14,2] (11 + 14 = 25, 14 + 2 = 16).

Sample input 2

4

2 7 2 7

Sample output 2:-

3

27. Ninja's Fantasy

Given an array ‘arr’ of size ‘N’ and an integer ‘M’. You are required to calculate the fantasy value for each index of the array ‘arr’.

Fantasy value for an index ‘i’ is defined as the sum of all the values ‘arr[x]’ in the array such that:

x < i,

arr[x] > arr[i], and

(arr[x] - arr[i]) % ‘M’ == 0

If the fantasy value of the corresponding index is odd, output 1. Otherwise, output 0.

Example :

N = 2, M = 3

arr = [5, 2]

For index 0, since there exists no ‘x’ < ‘i’, sum=0. Since 0 is even, we output 0.

For index 1, there exists ‘x=1’ < 2, such that arr[0]>arr[1] and arr[0] - arr[1] = 3 being perfectly divisible by 3. Hence sum = 5. Since 5 is odd, we output 1.

Therefore, output = [0, 1].

Input Format :

The first line contains an integer 'T' which denotes the number of test cases to be run. Then the test cases follow.

The first line of each test case contains 2 space-separated integers ‘N’ and ‘M’.

The second line contains ‘N’ space-separated integers denoting the elements of array ‘arr’.

Output format :

For each test case, print ‘N’ integers according to the parity of the fantasy value of the corresponding index of array ‘arr’.

Print the output of each test case in a new line.

Note :

You don’t need to print anything. It has already been taken care of. Just implement the given function.

Constraints :

1 <= T <= 10

1 <= N <= 10^4

1 <= M <= 10^4

1 <= arr[i] <= 10^9

Time Limit: 1 sec

Sample Input 1 :

1

5 2

4 2 5 1 3

Sample Output 1 :

0 0 0 1 1

Explanation Of Sample Input 1 :

For index 0 : Sum = 0(even).

For index 1 : Sum = 4(even).

For index 2 : Sum = 0(even).

For index 3 : Sum = 5(odd).

For index 4 : Sum is odd.

Hence, we output {0, 0, 0, 1, 1}.

Sample Input 2 :

2

3 3

12 9 3

4 5

15 10 1 5

Sample Output 2 :

0 0 1

0 1 0 1

28. Ultimate IITians Permutation

As you and The Ultimate IITians love Permutations. You give him 3 permutations of integers from {1...N}(contains all integers from 1 to N exactly once) that are ‘A’ and ‘P’ and 'Q'.
Now to make both permutations ‘P’, 'Q' equal the IITian can apply the below operations as many times as he wants.

According to the order defined by ‘A’, you can permute ‘P’. That is, you can replace ‘P’ with the array ‘C’ where ‘C[A[i]]’ = ‘P[i]’.

Your task is to find the minimum number of operations The Ultimate IITian will perform to make ‘P’ and ‘Q’ equal or -1 if it is impossible to do so.

Example :

N = 3

A = [2,1,3]

P = [1,2,3]

Q = [2,1,3]

Let us permute the array ‘P’ once :

We need to replace it with array ‘C’ where :

C[A[1]] = C[2] = P[1] = 1.

C[A[2]] = C[1] = P[2] = 2.

C[A[3]] = C[3] = P[3] = 3.

So, array C = [2, 1, 3].

New array ‘P’ = [2, 1, 3] which is equal to ‘Q’.

Thus, the minimum number of operations required is 1.

Input Format :

The first line contains an integer 'T' which denotes the number of test cases to be run.

The first line of each test case contains integer ‘N’.

The 2nd line contains ‘N’ space-separated integers denoting the elements of array ‘A’.

The 3rd line contains the elements of array ‘P’.

The 4th line contains the elements of array ‘Q’.

Output format :

For each test case, print an integer, the minimum number of operations or -1 if it is impossible. The output of each test case should be in a new line.

Note :

It is given that the answer fits in a 32-bit integer.

You don’t need to print anything. It has already been taken care of. Just implement the given function.

Constraints :

1 <= T <= 10

1 <= N <= 10^4

1 <= P[i], Q[i], A[i] <= N

Time Limit : 1 sec

Sample Input 1 :

1

3

2 3 1

1 2 3

2 3 1

Sample Output 1 :

2

Explanation Of Sample Input 1 :

After 1st operation on array ‘P’ :

New array ‘P’ = [3, 1, 2].

After 2nd operation on array ‘P’ :

New array ‘P’ = [2, 3, 1].

‘P’ = ‘Q’ Hence, the output is 2.

Sample Input 2 :

2

5

4 1 5 2 3

1 2 3 4 5

2 4 5 1 3

6

6 4 1 5 2 3

1 2 6 3 4 5

3 2 4 1 5 6

Sample Output 2 :

1

-1

29. Ninja Score

Given an array ‘arr’ of ‘N’ integers. The task is to divide the array into three consecutive subarrays(non-empty). You are also given a condition that the ‘Ninja Score’ of the subarrays should be maximum. ‘Ninja Score’ of three arrays is the number of distinct elements that are common in all three arrays. Find the maximum ‘Ninja Score’ that can be achieved?
Example: arr = [4,1,2,2,1,3,2,1]. If we divide the array into [4,1,2], [2,1,3], and [2,1], we can see that the numbers 1 and 2 occur in all the subarrays. Hence, the Ninja score is 2.

Input Format:

The first line contains ‘T’, denoting the number of test cases.

The first line of each test case contains two integers, ‘N’ denoting the number of elements.

The next line contains an ‘arr’ having ‘N’ space-separated integers.

Output Format:

For each test case, print an integer denoting the maximum ‘Ninja Score’ in a new line.

Note:

You are not required to print the expected output. It has already been taken care of. Just implement the function.

Constraints:

1 <= T <= 10

1 <= N <= 10^4

1 <= arr[i] <= 10^5

Time Limit: 1 sec

Sample Input 1:

2

4

3 3 3 3

4

3 7 2 1

Sample Output 1:

1

0

Explanation for Sample Input 1:

In the first test case, we can break the arrays as [3, 3], [3], [3], or any other possible way, we can observe that 3 occurs in all the subarrays. Hence, the Ninja score is 1.

In the 2nd test case, all the numbers are distinct. Hence, the ninja score is 0.

Sample Input 2:

2

9

4 2 1 1 2 4 4 1 2

5

1 5 1 4 1

Sample Output 2:

3

1

30. Ninja vs Tree

The Ultimate Ninja Ankush gave you a tree with 'N' vertices numbered from 1 to 'N', where each vertex has an assigned integer and 'Q' queries where each query can be of two types:

1 'X' 'Y': On the path between 'X' and 'Y' reverse the order of all the integers.

2 'X' 'Y': Find the path sum between 'X' and 'Y'.

Path sum is the sum of values of all nodes in the path.

Input Format:

The first line contains two space-separated integers, ‘N’ and ‘Q’, denoting the number of vertices of the tree and the number of queries.

The next N-1 lines will contain two space-separated integers X and Y, denoting an undirected edge between city X and city Y.

The next line contains ‘N’ space-separated integers denoting the value associated with each node.

The next q lines contain three space-separated integers representing the queries of both types.

Output Format:

For each type two query, print the answer in a new line.

Note

You are not required to print anything; it has already been taken care of. Just implement the function.

Constraints:

1 <= N, Q <= 10^4

1 <= X, Y <= N

1 <= value[i] <= 10^4

Where value[i] represents the value associated with any node of the tree.

Time Limit: 1 sec.

Sample Input 1:

12 3

1 2

2 3

3 4

1 5

5 6

5 7

1 8

8 9

9 10

9 11

9 12

10 8 5 9 12 16 8 18 21 11 19 20

2 4 7

1 1 6

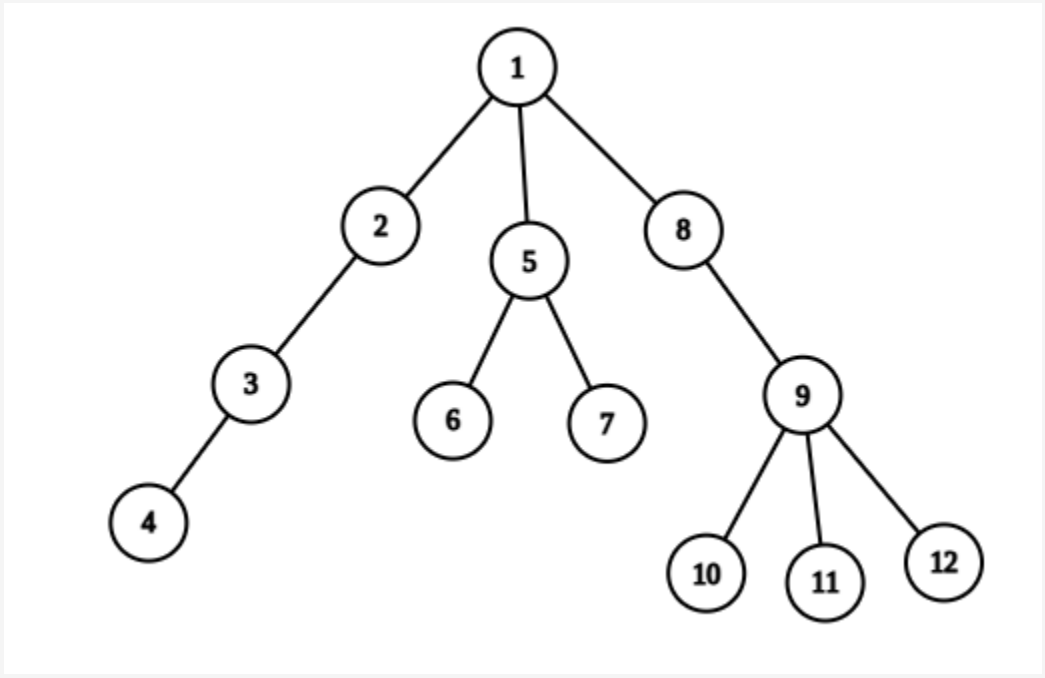
2 4 7

Sample Output 1:

52

58

Explanation For Sample Output 1:



In the first query, the path between 4 and 7 is 4, 3, 2, 1, 5, 7, and their corresponding height is 9, 5, 8, 10, 12, 8. Their sum is 52.

In the second query, the path is 1 5 6, and their corresponding values are 10 12 16. After reversing, their values will be 16 12 10. So, the final array will be 16 8 5 9 12 10 8 18 21 11 19 20.

In the third query, the path between 4 and 7 is 4, 3, 2, 1, 5, 7, and their corresponding height is 9, 5, 8, 16, 12, 8. Their sum is 58.

Sample Input 2:

5 4

1 5

2 1

3 2

4 3

2 5 4 1 3

2 3 3

1 2 5

2 4 5

2 5 1

Sample Output 2:

4

15

7

31. Buying Items

Given 'N' different items each of price 1 unit and an infinite number of coins, each of value 'K' units. Find the number of ways in which you can buy some(possibly 0) of the items from the shop such that the total price of the items you can buy must be multiple 'K'.
Print the ways modulo 10^5.

For Example:

Input : N = 4, K = 3

Output : 5

Explanation:

There are 4 type of items; you can buy 3 items in 3 ways ({1,2,3}, {2,3,4},{2,1,4}, and {1,3,4}). and 0 items in 1 way, hence there will be a total of 5 ways.

Input Format:

The first line contains a single integer 'T' denoting the number of test cases to be run. Then the test cases follow.

The only line in the input contains two integers separated by a space, 'N' and 'K' denoting the number of items and the worth of one coin, respectively.

Output Format:

For each test case, print an integer denoting the number of ways as specified above.

Note :

You are not required to print anything; it has already been taken care of. Just implement the function.

Constraints:

1 <= T <= 50

1 <= N <= 10^12

1 <= K <= 10^3

Time Limit: 1 sec.

Sample Input 1:

1

2 2

Sample Output 1:

8

2

Explanation For Sample Output 1:

In this test case you can buy 2 items in 1 way and 0 items in 1 way; hence answer = 2.

Sample Input 2:

2

4 2

7 3

Sample Output 2:

8

43