**Problem for Practice:**

**Problem 1:**

An alien is chasing after Raj and Ravi. Raj screams at times *p*,*p*+*x*,*p*+2*x*,*p*+3*x*,... and Ravi screams at times *q*,*q*+*y*,*q*+2 *y*,*q*+3*y*,....

The Monster will catch them if at any point they scream at the same time.

**Input**-

* The first line contains two integers *x* and *p*(1≤x,p≤100).
* The second line contains two integers *y* and *q*(1≤*y*,*q*≤100).

**Output** -

* Print the first time they will scream at the same time, or -1 if he cannot catch them (they never scream at same time).

**Sample Input:**

* 20 2  
  9 19

**Sample Output:**

* 82

**Problem 2:**

Shah and Rukhsurvives and gets recruited by Hela. Now they have to work for Hela else she would throw them off into the hell. Since Hela is a God of Death, she wants more people to work for her. On the Earth, Hela finds people with either good deeds or bad deeds. Also there are some exceptional people with neither good nor bad deeds. She wants to select some good people who are honest and would be ready to work for her at any cost and at any time she calls.

So, Hela provides a set of deeds of **N** people to Shah and Rukh (1 based indexing). For optimum selection she asks **Q** queries. In each query she provides a range of people from **l** to **r** (both inclusive) and asks both of them to find minimum number of people from the given range such that the product of their deeds is maximum, as they would be more honest and dedicated people.

If Shah and RukhmakesHela happy, they both would get combined and ultimately would become a legend named Shahrukh! Help Shah and Rukh find the minimum number of people with maximum product of their deeds.

**Input Format**

* The first line of the input contains an integer **N** denoting the number of people .
* Next line contains N space separated integers denoting the deeds of ith person.
* Next line has the number of queries, **Q**, Hela would ask
* Following Q lines contain two space separated integers **l** and **r** denoting the range (both inclusive)

**Constraints**

* **1** ≤ **N** ≤ **105**
* **-109** ≤ **a[i]** ≤ **109**
* **1** ≤ **Q** ≤ **105**

**Output Format**

Print an integer on a new line for each query that denotes the answer.

**Example**

**Input**

4

7 6 8 9

2

2 4

1 3

**Output :**

3

3

**Problem 3:**

Nilakshi was busy helping Linkin Park band in correcting their rhythm for their upcoming concert. She got so engrossed in it that she forgot she had an assignment to complete on XOR. She asks you to complete that assignment.

You are given a matrix A of size **n** x **m**(1 based indexing) and a string **s** containing either **"Row"** or **"Col"**(without quotes).

**STEP 1 :**  
If the string **s** is "Row", you have to form a matrix **B** of size **(n-1)** x **m** such that:  
For each i from 1 to n-1, j varies from 1 to m  
**Bij = Aijxor [A(i+1)1xor A(i+1)2xor ... xor A(i+1)m]**   
And if the string **s** is "Col", matrix **B** will be of size **n** x **(m-1)** such that:  
For each j from 1 to m-1, i varies from 1 to n  
**Bij = Aijxor [A1(j+1)xor A2(j+1)xor ... xor An(j+1)]**

**STEP 2:**  
For **s** = "Row", form a column matrix **C** using the matrix **B** such that:  
For each i from 1 to n-1  
**Ci1 = Bi1xor Bi2xor ... xorBim**  
And for **s** = "Col", form a row matrix **C** using the matrix **B** such that:  
For each j from 1 to m-1  
**C1j = B1jxor B2jxor ... xorBnj**

Now, you are given **Q** queries consisting of two types:  
**Type 1** : 1 x y z (Here you have to update Axy by z and Matrix B and C will change accordingly.)   
**Type 2** : 2 k (Here you have to print the **kth** smallest unique element from the Matrix C)

**NOTE :** If kth smallest unique element doesn't exist print "-1"(without quotes).

She is too tired and is short of time. You are her friend and also a programming geek.   
Write a program to get answers to her assignment.

**Input Format :**

* First line contains two space seperatedintegers**n** and **m**.
* Next **n** lines contain **m** space seperated integers of matrix **A**.
* Next line contains a string **s** containing either "Row" or "Col" (without quotes)
* Next line contains number of queries **Q**
* Following **Q** lines contain a query of either Type 1 or Type 2.

**Constraints**

* **1** ≤ **n,m** ≤ **103**
* **1** ≤ **A[i][j]** ≤ **109**
* **1** ≤ **Q** ≤ **105**
* **1** ≤ **x** ≤ **n**
* **1** ≤ **y** ≤ **m**
* **1** ≤ **k** ≤ **106**

**Output Format :**

For each query of Type 2, print a single integer denoting the answer on a new line. .

**Example**

**Input:**

2 2

1 2

3 4

Row

3

2 1

1 1 1 3

2 1

**Output:**

3

1

**Explanation:**

Here B matrix formed is B =[6, 5] and hence C=[3];  
So, first smallest element is 3 in matrix C.  
After updating A[1][1] by 3, B = [4, 5] and hence, C = [1].  
So, first smallest element is 1 in matrix C after updation.

**Problem 4:**

Daya from CID wants to break *n* consecutive doors.He will break only 2 doors or 1 door in a single kick.

ACP's condition is that number of kicks must be a multiple of *k* .

Find minimal number of kicks so Daya can break all gates that satisfies ACP's condition?

print -1 if not possible.

**INPUT**

* First line of input contains two integer *n* and *k* .

**OUTPUT**

* Output a single integer denoting the answer if it is not possible to find an answer satisfying the conditions then print -1 instead.

**CONSTRAINTS**

* 0≤n≤10000
* 1≤k≤10

**Sample Input:**

* 10 2

**Sample Output:**

* 6

**Problem 5:**

Chef has *N* strings with him. He knows his strings very well. A very intelligent guy named Frank comes along and asked him a few questions about the strings. Chef is busy right now, so you have to help him answer the queries by Frank There are *Q* queries each containing 3 integers *L*,*R*,*C* and 1 character *P*. You are supposed to tell how many strings from *L* to *R* have the character *P* at position *C*

. String contains lowercase letters only.

*Note*

: Use one based indexing

**Input:**

* First line will contain *N*

, number of strings. Followed by *N*

 lines each containing a string each

 Next line contains *Q*

 , number of queries.

 Next*Q* lines contain 3 integers and 1 character, denoting *L*,*R*,*C*,*P*

* respectively.

**Output:**

For each query, output the answer in a new line.

**Constraints**

* 1≤*N*≤100000

1≤*Q*≤100000

1≤*L*,*R*≤*N*

1≤|*S*|≤20

**Subtasks**

* 30 points : 1≤*N*,*Q*≤1000
* 70 points : Original Constraints

**Sample Input:**

3

chef

cut

frank

1

1 3 1 c

**Sample Output:**

2

**Problem 6:**

Chef is a pro in handling a katana. So he again decides to play a game with **N** sticks each having a particular height, his aim is to finish all the sticks he has. Now he does this in a particular way! **He selects the largest continuous subsegment of sticks in which every stick has non zero height** and then selects a non zero height and then swing the katana in the selected segment and removes the lower cut part and the leftover upper part comes down with reduced height. He does this untill no sticks are left. Now since the Chef is a pro the order of the sticks wont change

**This reduced height can be zero for example if you have only one stick of length 5 then you swing the katana at height 5 then remove the lower part which is the entire stick and then nothing is left**

**Also the height you select should not be greater than the smallest stick in the subsegment you selected!**

Since Chef still hasn't completed the cupboard, he asks for help!

He asks you to calculate the minimum number of swings needed to finish all the sticks so he can come back later and finish the task quickly!

**Input:**

* First line will contain *N*

 , number of Sticks.

 Next line contains *N*

* integers representing the height of each stick and also in the order in which they are placed.  
  **The order of the sticks can't be changed.**  
  **NOTE:** Use faster I/O methods.

**Output:**

For each testcase, output in a single line the minimum steps needed.

**Constraints**

* 1≤*N*≤106

1≤*Height*≤104

**Subtasks**

* 10 points : 1≤*height*≤2

 20 points : 1≤*N*≤103

 70 points : *OriginalConstraints*

**Sample Input:**

5

1 2 3 2 1

**Sample Output:**

3

**EXPLANATION:**

Swing 1: Segment(1,5) and height(1)  
**The sticks now look like 0 1 2 1 0**  
Swing 1: Segment(2,4) and height(1)  
**The sticks now look like 0 0 1 0 0**  
Swing 1: Segment(3,3) and height(1)  
**The sticks now look like 0 0 0 0 0**

**Problem 7:**

Chef’s wife asked Chef to build a cupboard of the following specifications. **Assume that the width of the base is *X*. Then the Length of the base should not exceed (*A*−*X*) and the Height of the cupboard should not exceed (*B*−*X*). Also The Volume of the Cupboard should be maximum.** Chef’s wife gives him the two integers *A* and *B* and asks him to find an integer *X* such that the Volume is maximum. Since Chef is trying out a new recipe, Chef asks you to help him find *X*. If there are multiple such *X*

then find the smaller one.

**Note: All dimensions should be strictly positive integers.**

**Input:**

* First line will contain *T*

 , number of testcases. Then the testcases follow.

 Eachtestcase contains of a single line of input, two integers *A*,*B*

* .

**Output:**

For each testcase, output in a single line the value of *X*

and the maximum volume.

**Constraints**

* 1≤*T*≤500000

2≤*A*,*B*≤50000

**Subtasks**

* 30 points : 2≤*A*,*B*≤500

 70 points : 2≤*A*,*B*≤50000

**Sample Input:**

1

378 299

**Sample Output:**

111 5571756

**Problem 8:**

*Chef* has entered into a *warzone*. He wants to conquer *Pochinki*. In his mission he needs *special* bullets to knock his enemies down. As he is busy clearing the path for his friends, he wants your help to find how many *special*

bullets he has.

You are given a series of *N*

integers which represents powers of bullets. You need to find the number of *special*

bullets.

A bullet is said to be *special*

if its power is *greater* than and *divisible* by powers of all of its *adjacent*

bullets.

**Input:**

* The first line of the input contains a single integer *T*

 denoting the number of test cases.

 The description of *T*

 test cases follows.

 The first line of each test case contains a single integer *N*

 .

 The second line of each test case contains series of *N*

* space-separated integers.

**Output:**

For each test case, print a single line containing one integer — the number of *special*

bullets.

**Constraints**

* 1≤*T*≤10

2≤*N*≤105

 Series contains non-negative integers ≤109

**Sample Input:**

2  
5  
2 4 2 8 4  
6  
6 2 4 1 8 3

**Sample Output:**

2  
2

### EXPLANATION:

Test Case 1 :

Bullet with power 4 is special because 4 is greater than and divisible by 2.  
Bullet with power 8 is special because 2 and 4 are less than 8 and 8 is divisible by 2 and 4.

Test Case 2 :

Bullet with power 6 is special because 2 is less than 6 and 6 is divisible by 2.  
Bullet with power 4 is special because 2 and 1 are less than 4 and 4 is divisible by 2 and 1.  
Bullet with power 8 is not special because it is not divisible by 3.

**Problem 8:**

Your little friend, Shinchan is playing video games with his little sister, Himawari during his holidays. The video game is about their Superhero, Action Kamen. According to the game, in each trail, Shinchan will have some power of Action Beam **S** and Himawari will have some power of Action Beam **H**. In each trial, the winner is one with greater power of Action Beam.If the power of Action Beam of Shinchan and Himawari is same, Shinchan considers his little sister, Himawari the winner, since he has a soft corner for his little sister.

Can you figure out who is the winner, given the power of Action Beams of Shinchan and Himawari.

**Input**

* The first line contains a single integer **T** denoting the number of test cases. Then, **T** test cases follow.
* The one and only line of each test case, contains two space-separated integers **S** and **H**.

**Output**

For each test case output a single line containing the winner of each trial, “Shinchan”(without quotes) or “Himawari”(without quotes).

**Constraints**

* **1** ≤ **T** ≤ **106**
* **0** ≤ **S**, **H** ≤ **105**

**Example**

**Input**

3

2 9

5 5

8 4

**Output**

Himawari

Himawari

Shinchan

**Problem 9:**

Shahid is a computer science student and his teacher gave him a simple question to solve within time but he is little busy in his life, so he asked you to solve this problem.

Problem statement : You have been given an array of positive integers **A1,A2,...,An** with legnth**N** and you have to print an array of same legnth(**N**) where the values in the new array are the sum of every number in the array, except the number at that index.

**Input:**

* The first line of input contains a single integer **T** denoting the number of test cases.
* Each test cases contain two lines.First line contains **N**, the length of the array and second line contains **N** space separated positive integers.

**Output:**

For each test case, output a single array of same length.

**Constraints:**

* 1 ≤ T ≤ 100
* 1 ≤ N ≤105
* 0 <= A[i] <= 109

**Example:**

**Input**

2

4

1 2 3 4

3

4 5 6

**Output**

9 8 7 6

11 10 9

Problem 10:

Chef has a dog name Bruno. He's very happy and well-behaved dog but he's very lazy.So one day chef decided to put him on a action test for 60 days. On day 1 the chef keeps a quota of 1 biscuits, each day the quota will be doubled. If Bruno is active on ith day he will be given all the biscuits in the quota that day, otherwise, he is given zero biscuits. Find the total number of days Bruno was active when the total number of Biscuits he ate are given.

**Input**

The first line of the input contains an integer **T** denoting the number of test cases. For each test case, there is a Integer **N** denotes the total number of biscuits Bruno ate.

**Output**

For each test case, output a single line containing the number of days Bruno was active.(An answer always exists.)

**Constraints**

* **1≤T≤100**
* **1≤N≤105**

**Example**

**Input:**

2

1

10

**Output:**

1

2

**Problem 11:**

Chef is visiting NetajiSubhash Engineering College in the month of October. The authority planned to set up a welcome programme for Chef. The programme includes a party within the college. To make things look grand, the glasses will be kept in a triangular fashion in such a way that the glasses along the left margin of the triangular structure(including the topmost glass) will be green in color and the rest will be red. You will have to find for **N** no. of glasses, the number of glasses that will be green. If the triangle cannot be formed with the total number of glasses then print -1.

For example, for **N** as 6, the bottom row will be of 3 glasses then the 2nd row with 2 glasses and lastly, one at the top. Also, note there can be 1 glass only.

**Input**

* The first line of the input contains an integer **T** denoting the number of test cases.
* The first line of each test case contains a single integer **N** denoting the total number of glasses.

**Output**

For each test case, output a single line containing the answer.

**Constraints**

* **1**≤**T**≤**100**
* **0**≤**N**≤**107**

**Example**

**Input:**

2

3

4

**Output:**

2

-1

**Explanation**

**Test case 1.** A triangular structure can be formed with 3 glasses with each side 2.

**Test case 2.** A triangular structure cannot be formed with 4 glasses.

**Problem 12:**

Chef loves to play with sequence. One day a friend of chef gave him a sequence of integers **a1, a2, ..., an**. and told him to find the maximum of strength of the sequence. Defining the strength of the sequence to be **|a1 - a2| + |a2 - a3| + ... + |an-1 - an| + |an - a1|**. Chef wants to make his sequence stronger, so he reorders his sequence into a new sequence**b1, b2, ..., bn**. He wants this new sequence to be as strong as possible. Help chef to find the maximum strength of the resulting sequence

**Input**

The first line contains a single integer **N** denoting the number of elements in the sequence. The next line contains the sequence of **N** space seperated integers.

**Output**

Print the maximum possible strength of the sequence.

**Constraints**

* **1** ≤ **N** ≤ **105**
* **10-9** ≤ **A[i]** ≤ **109**

**Example**

**Input:**

4

1 2 4 8

**Output:**

18

**Explanation:**

We can reorder the given sequence to form 1 8 2 4, which yields the strength of |1-8| + |8-2| + |2-4| + |4-1| = 18.

**Problem 13:**

Chef is new to job. At his new job, there are few instructions one has to follow :-

1. An employee is given **N** works at once and asked to finish the job within **N** days.
2. To ensure the quality of work, the employees are warned not to complete **N** works in a single day.
3. Since every work is given equal importance, they want every employee to perform equal number of work everyday.

An employee is given extra payment if he/she is able to complete **N** works before **N**days(atmost one can take **N-1** days).

Being a disciplined Chef, he will not disobey any of the instructions at his new job. At the same time, our Chef is determined not to lose any extra payment. Our Chef, being quite reputed, has options at hand to join other jobs. He leaves the job and joins a new job if he loses extra payment.

Help find Chef the number of ways available to Chef to accomplish the **N** given works with extra payment.

**Input**

* The first line of the input contains single integer **T**, denoting the number of test cases. Then **T** test cases follow.
* The only line of each test case contains **N**, the number of works given to Chef.

**Output**

For each test, output the number of ways available to Chef to accomplish the **N** given works in a single line. If our Chef leaves the job output **-1**.

**Constraints**

* 1 ≤ **T** ≤ 1000000
* 2 ≤ **N** ≤ 10000

**Example**

**Input**

2

2

4

**Output**

-1

1

**Explanation**

**Test case 1: N** = 2

By the instructions given at his new job, Chef has to finsh work within **2** days, but cannot finish work in **1** day.

Chef is determined not to lose any extra payment. So, he want to do the job, atmost in **1** day.

But, he is restricted from finishing the job in **1** day by the instructions.

So, he leaves the job. :(

**Test case 2: N** = 4

Chef does **4** works in **2**days(**2** works per day).

For completing the **4** works before **4** days, Chef gets extra payment :).

**Problem 14:**

A Keyboard manufacturing company, built some faulty qwerty keyboards. As soon as they realized that some of the keyboards are faulty they tried to develop a software to correct them but their developers are noobs so they ask you to develop the software for them.

The issue with the keyboard is that the key placement is not appropriate. The keys of the right hand are faulty.

 When the user press j it appears h. Similarly when you press h it appears as ;(semi-colon), y → p, b → .(full stop).

**Input**

* The first line contains an integer **T**, total number of test cases.
* Each of the next **T** lines contain a sentence **S**(containing only lower-case english alphabets and valid characters as described) printed by the faulty keyboard.

**Output**

For each test case print the correct sentence the user wants to type in a new line.

**Constraints**

* **1** ≤ **T** ≤ **100**
* **1** ≤ **|S|** ≤ **105**

**Example**

**Input:**

3

;ekkiwirkd

cidec;ef

origrannubg

**Output:**

hello world

codechef

programming

**problem 15:**

Chef’s brother has visited the Chef during his summer vacation. Chef’s brother loves to play with numbers. So Chef gave him **2** numbers **A** and **B**. Chef asked his brother to find the minimum number of steps required to reach **B** from **A** given only the following operations can be performed any number of times:

* **Decrement** the current number by **1**
* **Increment** the current number by **3**
* **Multiply** the current number by **2**

Chef’s brother found this problem very easy and asked you to solve it. Can you solve this problem for him?

**Input**

* The first line of the input contains an integer **T** denoting the number of test cases. The description of T test cases follows.
* The first and only line of each test case contains two space-separated integers **A** and **B**.

**Output**

For each test case, output a single line containing the answer.

**Constraints**

* **1** ≤ **T** ≤ **100**
* **0** ≤ **A,B** ≤ **2\*103**

**Example**

**Input:**

2

4 7

0 10

**Output:**

1

4

**Explanation**

**Test case 1.** You can reach from 4 to 7 in just one step by adding 3.

**Test case 2.** It is possible to reach 10 from 0 in just 4 steps. 0 -> 3 -> 6 -> 5 -> 10 First add 3 to the number 2 times to get 6, then subtract 1 from it to get 5, and then just double it to get 10.

**Problem 16:**

The King of Chefland, as you can all guess, is Chef himself. Chef loves his territory so much that he has built Palace for himself in every city of his territory. Every weekend, Chef loves to travel from one city **S** to another city **D** within his territory and spend the week in his palace in city **D**. But, every road in Chefland connecting one city to another is unidirectional road, i.e. one can move only from one city to another but not in the reverse direction. Chef has ordered his minister to make the required arrangements for his travel. The arrangements his minister can make are :-

1. Convert any number of existing roads to bidirectional roads
2. Build a new road from city **S** to city **D**

The total cost of converting all unidirectional roads of Chefland to bidirectional roads is less than building a new road. Now being a responsible minister of Chefland he wants to find the minimum number of roads he has to convert or build a new road if required.

**Input**

* The first line of the input contains a single integer **T** denoting the number of test cases. The description of **T** test cases follow.
* The first line of each test case contains two integers **N** and **M** denoting the number of cities and the number of roads respectively. **M** lines follow. Each of the **M** lines contain two space-separated integers **A** and **B** denoting there is a unidirectional road from city **A** to city **B**. The next line contains two space-separated integers **S** and **D** denoting the Chef wants to travel from city **S** to city **D**.

**Output**

For each test case, output a single line containing the **minimum no of roads to convert**. If it is needed to build a new road, then output **-1**.

**Constraints**

* **1** ≤ **T** ≤ **100**
* 2 ≤ **N** ≤ **100000**
* 1 ≤ **M** ≤ **100000**
* 1 ≤ **A**,**B**,**S**,**D** ≤ **N**

**Example**

**Input:**

* **Test 1:**
* 1

7 7

1 2

2 4

1 3

5 3

5 6

6 4

7 5

1 7

* **Test 2:**
* 1

10 9

1 2

2 4

1 3

5 3

5 6

6 4

7 5

9 10

10 8

1 10

**Output:**

2

-1

**Explanation**

**Test case 1:**

You can simple make the roads from city 5 to 3 and from city 7 to 5 bidirectional. So the minimum possible answer in 2.

**Test case 2:**

You cannot reach from city 1 to city 10 by making any existing roads bidirectional. So you need to construct a new road. Hence the answer is -1.

**Problem 18:**

*Chef* has been assigned with a task. Given are *Nbinary* strings *Si*(1<=*i*<=*N*) and their weights *Wi*(1<=*i*<=*N*)

.

Chef has to answer *Q*

queries, each query contains a string *R*. For each query chef needs to find sum of weights *Wi*(1<=*i*<=*N*) of all the strings whose *prefix* matches with the string *R*

.

Chef being busy in playing PUB-G, has asked you for help. Help him to answer his queries.

Since sum can be large, output *sum*

modulo 1000000007 (109+7

).

*Note*:

Binary strings are the strings with '1's and '0's only.

**Input:**

* First line will contain *N*

, number of Binary strings. Next *N*

 lines follow.

 Each line contains of a string *Si* and weight assigned to it *Wi*

 .

 Next line contain an integer *Q*

 ,the number of queries.

 Next Q lines follow, each line with a string *R*

* .

**Output:**

For each query, output in a single line answer given by *sum*

of weights modulo 1000000007.

**Constraints**

* 1≤*N*,*Q*≤105

1≤|*S*|≤10

1≤|*R*|≤10

1≤*Wi*≤10*XwhereX*=18

**Subtasks**

* 15 points : 1≤*N*,*Q*≤103

 85 points : *OriginalConstraints*

* .

**Sample Input:**

5

101 5

000 3

001 5

010 1

111 9

4

00

1

0

011

**Sample Output:**

8

14

9

0

**Problem 19:**

*Chef* and his *friend* are playing *PUBG*. Chef is *knockedOut* by enemies. His friend is about 30*m* away from him. The game is in its closing minutes. Chef's friend do not want to risk his life for Chef. So, Chef's friend asks a query to Chef. If he answers it, his friend will try to *revive*

him.

*A*,*B*,*X*,*Y*,*i*

are integers.

Function *F*

is defined as,

if i = 0 : F(i) = X

if i = 1 : F(i) = Y

Otherwise : F(i) = A\*F(i-1) + B\*F(i-2) + (i\*i)

Chef being Knocked Out can't solve the query. So he has asked you for help.

You are asked *Q*

queries. Each query consists of 5 integers : *A*,*B*,*X*,*Y*,*i* and you have to answer *F*(*i*) modulo 109+7

.

**Input:**

* First line will contain *Q*

 , number of queries. Then the queries follow.

 Each query contains of a single line of input, 5 integers *A*,*B*,*X*,*Y*,*i*

* .

**Output:**

For each query, output in a single line value of F(i) modulo 1000000007.

**Constraints**

* 1≤*Q*≤1000

0≤*A*,*B*,*X*,*Y*,*i*≤10*XwhereX*=12

**Subtasks**

* 5 points : 0≤*A*,*B*,*X*,*Y*,*i*≤8

 10 points: 0≤*A*,*B*,*X*,*Y*,*i*≤103

 85 points : *OriginalConstraints*

**Sample Input:**

1  
1 1 1 1 2

**Sample Output:**

6

**EXPLANATION:**

F(0) = 1

F(1) = 1

F(2) = 1\*F(1) + 1\*F(0) + 2^2 = 1\*1 + 1\*1 + 2\*2 = 1 + 1 + 4 = 6

ANSWER = 6%1000000007 = 6

**Problem 20**

*Chef* is in the *map* of *PUBG*. The map has *N* cities numbered 1,2,...,*N*. The cities are connected by *N*−1

bidirectional roads.

He has formed a strategy to travel in this map.

Initially all cities are marked as *BLACK*

.  
Chef is currently in the city *X*

.

*STEP*

1: He marks the current city as *RED*.  
*STEP*2: He selects a *BLACK* city at *randomdirectly*

connected to the current city and visits it i.e the selected city becomes the current city.

He will repeat these *two*

steps*K* times and then he marks the current city as *GREEN* and then he *stops*. If at any step, he does not have any city to choose then he marks the current city as *GREEN* and then he *stops*

.

You are asked *Q*

queries each consisting of *X*,*Y*,*K*.  
You should output the probability of chef stopping in the city *Y* i.e. the probability of city *Y* being *GREEN*

.

It can be proven that this probability can be written as a fraction *P*/*Q*

, where *P*≥0 and *Q*>0 are integers. Therefore, you should compute P\*(Q^−1) modulo 109+7, where Q^−1 denotes the *modularinverse* of *Q* modulo 109+7. (It is guaranteed that this inverse *exists* and is *unique*

.)

*Note*:

The graph described in the input is a *tree*.  
All queries are *independent*

of each other.

**Input:**

* First line will contain *T*

 , number of testcases. Then the testcases follow.

 Eachtestcase contains of an integer *N*

 .

 Next*N*−1 lines follow two space separated integers *U* and *V* denoting a road between cities *U* and *V*

 .

 Next line contains of one integer *Q*

 .

 Next*Q* lines follow three space separated integers *X*,*Y* and *K*

* .

**Output:**

For each query, you should output a single integer, P\*Q^-1 modulo 109+7

;

**Constraints**

* 1≤*T*≤2

2≤*N*≤105

1≤*Q*≤105

1≤*X*,*Y*≤*N*

1≤*K*≤10*XwhereX*=12

 The graph described in the input is a *tree*

 .

 All queries are *independent*

* of each other.

**Subtasks**

* 10 points : 1≤*N*,*Q*≤1000

 30 points : 1≤*N*,*Q*≤105,*heightoftree*<=30

 60 points : *OriginalConstraints*

**Sample Input:**

1  
3  
1 2  
1 3  
4  
1 2 1  
2 3 1  
2 1 2  
2 3 5

**Sample Output:**

500000004  
0  
0  
1

**EXPLANATION:**

1. The probability is 1/2. (1\*2^-1) modulo 10^9+7 = 500000004.
2. The probability is 0/1. (0\*1^-1) modulo 10^9+7 = 0.
3. The probability is 0/1. (0\*1^-1) modulo 10^9+7 = 0.
4. The probability is 1/1. (1\*1^-1) modulo 10^9+7 = 1.

**Problem 21:**

Dexter lives in FairyLand and he has ***N***friends in WeirdLand. They only wake in a specific range of days of the year called **awake range**. He wants to throw a party and wants to have as many as possible couples( *1M* + *1F* ) to celebrate.

So he selects a day of the year and sends invitations to some awake friends( You are given Gender,awake range of all invited friends ).

**INPUT**

* First line of the input contains a **single integer***N* - number of friends.
* Next *N* lines ,each lines contains a character *F* for female or *M* for Male next two integer (*A*,*B*) denotes the range of days in which the person is awake

**OUTPUT**

* **Single integer** denoting maximum number of couples that can attend the party.

**Constraints**

* *1*<=*N*<=*5000*
* Character is either F or M.
* 1<=*A*,*B*<=*366*

p>**Sample Input:**

* 4 M 151 307  
  F 343 352  
  F 117 145  
  M 24 128

**Sample Output:**

**1**

**Problem 22:**

According to a new AFGJI standard, a flag of every SCHOOL should have a chequered field **n × m**, each square should be of one of 10 colours, and the flag should be «striped»: each horizontal row of the flag should contain squares of the same colour, and the colours of adjacent horizontal rows should be different. ABC SCHOOL asked you to find out whether their flag meets the new AFGJI standard.   
  
***Input***  
  
The first line of the input contains numbers **n** and **m(1 ≤ n, m ≤ 100)**, **n** — the amount of rows, **m** — the amount of columns on the flag of ABC SCHOOL. Then there follows the description of the flag: each of the following **n** lines contain m characters. Each character is a digit between **0** and **9**, and stands for the colour of the corresponding square.   
  
***Output***  
  
Output**YES**, if the flag meets the new AFGJI standard, and **NO** otherwise.   
  
**Examples**

**Input**  
3 3   
000   
111   
222   
  
**Output**  
YES

**Input**  
3 3   
000   
000   
111   
  
**Output**  
NO

**Input**  
3 3   
000   
111   
002   
  
**Output**  
NO

**Problem 23:**

Special Agent Smart Ansel works in a secret research department of CTOPA. He's been working there for a long time and is satisfied with his job, as it allows him to eat out in the best restaurants and order the most expensive and exotic wood types there.   
  
The content special agent has got an important task: to get the latest research by American scientists on the English Language. These developments are encoded and stored in a large safe. Ansel's teeth are strong enough, so the authorities assured that upon arriving at the place the Ansel won't have any problems with opening the safe.   
  
After he finishes his Mocktail, he leaves for this important task. Of course, the Ansel arrived at the location without any problems, but alas. He can't open the safe with his strong and big teeth. At this point, the Smart Ansel get a call from the headquarters and learns that opening the safe with the teeth is not necessary, as a reliable source has sent the following information: the safe code consists of digits and has no leading zeroes. There also is a special hint, which can be used to open the safe. The hint is string s with the following structure:   
  
1. if **si** = "?", then the digit that goes i-th in the safe code can be anything (between 0 to 9, inclusively);   
  
2. if**si** is a digit (between 0 to 9, inclusively), then it means that there is digit si on position i in code;   
  
3. if the string contains letters from **"A"** to **"J"**, then all positions with the same letters must contain the same digits and the positions with distinct letters must contain distinct digits.   
  
The length of the safe code coincides with the length of the hint.   
  
For example, hint *"?JGJ9"* has such matching safe code variants: *"51919"*, *"55959"*, *"12329"*, *"93539"* and so on, and has wrong variants such as: *"56669"*, *"00111"*, *"03539"* and *"13666"*.   
  
After receiving such information, the authorities change the plan and ask the special agents to work quietly and gently and not to try to open the safe by mechanical means, and try to find the password using the given hint.   
  
At a special agent school the Smart Ansel was the fastest in his platoon finding codes for such safes, but now he is not in that shape: the years take their toll ... Help him to determine the number of possible variants of the code to the safe, matching the given hint. After receiving this information, and knowing his own speed of entering codes, the Smart Ansel will be able to determine whether he will have time for tonight's show "Ansels are on the trail" on his favorite TV channel, or he should work for a sleepless night...   
  
***Input***  
  
The first line contains string s — the hint to the safe code. String s consists of the following characters: ?, 0-9, A-J. It is guaranteed that the first character of string s doesn't equal to character 0.   
The input limits for the problem:   
1 ≤ |s| ≤ 5.   
  
Here |s| means the length of string s.   
  
***Output***  
  
Print the number of codes that match the given hint.   
  
**Examples**

**Input**  
AJ   
**Output**  
81

**Input**  
1?AA  
**Output**  
100

**Problem 24:**

Pratyush and Vaibhav are playing a game. Pratyush's got **n** non-transparent glasses, standing in a row. The glasses' positions are indexed with integers from **1** to **n** from left to right. Note that the positions are indexed but the glasses are not.   
  
First Pratyush puts a marble under the glass in position **s**. Then he performs some (possibly zero) shuffling operations. One shuffling operation means moving the glass from the first position to position p1, the glass from the second position to position p2 and so on. That is, a glass goes from position i to position pi. Consider all glasses are moving simultaneously during one shuffling operation. When the glasses are shuffled, the marble doesn't travel from one glass to another: it moves together with the glass it was initially been put in.   
  
After all shuffling operations Pratyush shows Vaibhav that the ball has moved to position t. Vaibhav's task is to say what minimum number of shuffling operations Pratyush has performed or determine that Pratyush has made a mistake and the marble could not have got from position **s** to position **t**.   
  
***Input***  
  
The first line contains three integers: **n, s, t (1 ≤ n ≤ 105; 1 ≤ s, t ≤ n)** — the number of glasses, the ball's initial and final position.   
The second line contains **n** space-separated integers: p1, p2, ..., pn (**1 ≤ pi≤ n**) — the shuffling operation parameters. It is guaranteed that all pi's are distinct.   
Note that s can equal t.   
  
***Output***  
  
If the marble can move from position **s** to position **t**, then print on a single line a non-negative integer — the minimum number of shuffling operations, needed to get the marble to position **t**. If it is impossible, print number **-1**.   
  
**Examples**

**Input**  
4 2 1  
2 3 4 1   
  
**Output**  
3

**Input**  
4 3 3   
4 1 3 2   
  
**Output**  
0

**Input**  
4 3 4   
1 2 3 4   
  
**Output**  
-1

**Problem 26:**

One day Watson found a sequence of **n** integers, written on a whiteboard. Watson can perform one operation with it, the operation consists of two steps:   
  
1. Find the number that goes **k-th** in the current sequence and add the same number to the end of the sequence;  
2. Delete the first number of the current sequence.   
  
Watson wonders after how many operations all numbers on the board will be the same and whether all numbers will ever be the same.   
  
***Input***  
  
The first line contains two space-separated integers**n** and **k(1 ≤ k ≤ n ≤ 105).**  
  
The second line contains **n** space-separated integers: a1, a2, ..., an (1 ≤ ai ≤ 105) — the sequence that Watson found.   
  
***Output***  
  
Print the minimum number of operations, required for all numbers on the whiteboard to become the same. If it is impossible to achieve, print -1.   
  
**Examples**

**Input**  
3 2   
3 1 1   
  
**Output**  
1

**Input**  
3 1   
3 1 1   
  
**Output**  
-1

**Problem 27:**

Adhiraj, Bhavesh, Chirag decided to go on a trip to Hong Kong. They enjoyed very much on the trip. Now, the time of returning to home has arrived so they decided to equally distribute the expenses of the trip so that the trip would be fair (Since everyone should be happy after the trip). Since they are very tired after the whole trip hence want you being their friend to help them distribute the whole money.

(Let's call Adhiraj A, Bhavesh B, ChiragC )…

Even they want that they have to do the least number of transaction to one another (as they are very tired).

You being their friend decided to help them.

**Input:**

The first line will contain T that is number of test cases Each line of test case contains A, B, C that is the amount paid by Adhiraj, Bhavesh, Chirag during the trip.

**Output:**

For each test case, you have to print the least number of transactions that have to be made between the friends so that the money could be equally distributed.

**Constraints**

* 1<=T<=100000
* 0<=A, B, C<=10^8
* A+B+C is divisble by 3

**Sample Input:**

2  
2 4 3  
7 3 2

**Sample Output:**

1  
2

**Problem 28:**

The chef has prepared huge amounts of cake for Gavneesh's birthday! As everyone knows, he just loves the icing on the cakes. Also everyone knows that frosting can be on top of the cake and on the boundaries. So, chef decides to make Gavneesh happy and maximise the amount of icing!

For this problem, we will consider cakes as 2D rectangles.

To increase the amount of icing the cakes can have, the chef decided to cut some cakes. Each cake can be cut only once and the resulting pieces must also be rectangular.

Also, chef decides to cut at most K cakes so that no one gets suspicious.

Help the chef in figuring out the amount of extra icing needed to ice the newly formed boundaries.

**Input:**

First line contains the number of cakes, N and the max cuts chef can do, K.  
Each of the following N lines gives the length l and breadth b for each cake.

**Output:**

Output the amount of extra icing needed.

**Constraints**

* 1<=N<=100000
* 0<=K<=N
* 1<=l,b<=10000

**Sample Input:**

2 1

4 6

2 8

**Sample Output:**

16

**Problem 29:**

A gang of **K** robbers have broken into a jewellery shop having **N**jewelleries at night and there is nobody to stop the robbery. The robbers are intelligent and have planned that after the robbery is complete they will run separately and then meet later some day with their corresponding jewellery to distribute the amount equally because if by chance anyone gets caught then the remaining robbers can still be safe. They decided that each one of them will carry exactly one jewellery. You are given the price of each jewellery in the shop. You have to tell the maximum amount that the robbers can steal.

### Input

First line will contain T, number of testcases. Then the testcases follow.

First line of each test case contains two integers N, K.

Second line has N space separated integers, where ith integer P(i) denotes the price of the ithjewellary

### Output

For each test case,print the maximum amount of jewellery they can steal.

### Constraints

* **1** ≤ **T** ≤ **100**
* **1** ≤ **K** ≤ **N** ≤ 100000
* **1** ≤ **P(i)** ≤ **100000**

### Example

**Input:**

Number of Robbers: 4

Shops Stolen: 3

No of jewellary: Value of **24**

Robber 1: 6

*Price of Item:200*

Robber 2:4

Price of Item:24

Robber 3:10

Price of Item:56

Robber 4:4

Price of Item:250

**Problem 30:**

Everybody wants goodies! Especially with the chef's swagger!  
But you need laddus to redeem them.

There are n people in the HASH club and everyone has some laddus, but they are not sure that they have enough. To ensure that the maximum number of people have access to the goodies, they decide to form pairs of 2 and share the goodies.

When A and B form a pair, they add their laddus and redeem them for 1 goodie which then they share.

The president of HASH club asks you to tell him how many people would be left with no goodies after forming pairs and redeeming laddus.

Pairs are formed in an optimal manner.

(NOTE: People outside a pair cant share laddus or goodies)

**Input:**

* The first line of input contains n, the number of people in HASH club and k, the number of laddus required to redeem 1 goodie.
* Next line contains n integers, denoting the number of laddus each student has.

**Output:**

Output the minimum of the number of people left without goodies after they form pairs and redeem their laddus.

**Constraints**

* 2<=n<=100000
* 1<=k<=1000000000
* n is even
* each student can have at most 10^9 laddus and he may be unlucky and have 0 laddus :(

**Sample Input:**

4 100

90 80 15 40

**Sample Output:**

0

**Problem 31;**

Shubham loves palindromes. And he loves them so much so that he is willing to transform the strings he has to turn them to palindromes.

Formally, given a string s, he takes subset of the characters of s and arranges them to form a palindrome. He wants to do it in such a way that length of palindrome is as big as it can get.

To save the strings from transformations, the government has decided to encrypt all the strings before he gets access to them to confuse him.

Encryption pseudocode is as follows:

string encrypt(string s, int x,int d)

stringencs="";

for i = 0 to length(s)

encs += charof( (val(s[i]) + x + i\*d)%26 );

//val gives 0 for 'a', 1 for 'b' and so on

//charof gives 'a' for 0, 'b' for 1 and so on

return

Being shubham's friend, you do not want to disappoint him. Help him to find out the length of biggest palindrome he can make after decrypting the given string.

**Input:**

First line contains the parameters x and d  
Second line contains the encrypted string s

**Output:**

Output the length of biggest palindrome Shubham can make after decrypting the given string.

**Constraints**

* 0<=x,d<=25
* 1<=length(s)<=10^6

**Sample Input:**

1 1

hash

**Sample Output:**

1

**EXPLANATION:**

"hash" decrypts to "gypd".  
For "gypd", possible palindromes are "g", "y", "p" and "d".  
Max length is 1.

**Problem 32:**

Adhiraj again, had a party with his friends. He is completely drunk and as a result of which he thinks of this world as a straight line. Adhiraj is currently at position (x,0) and his home is at position (y,0). Now there is a problem, Adhiraj has forgotten how to walk (he is drunk of course). He thinks that at any moment he can either take 'f' steps forward or 'b' steps backwards. Can Adhiraj reach home?

Forward means +x direction, backward means -x direction.

**Input:**

* The first line will contain *T*
* , number of test cases. Then the test cases follow.
* Each case contains 4 integers, f (forward steps), b (backward steps), x (position of Adhiraj), y (position of home)

**Output:**

For each case, print “YES” or “NO” (without quotes) whether Adhiraj can reach home or not.

**Constraints**

* 1 <= T <= 100000
* 0 <= f,b,x,y<= 10^18

**Sample Input:**

2

5 10 5 10  
2 6 6 9

**Sample Output:**

YES

NO

**Problem 33:**

Given a string of alphabets containing some uppercase and some lowercase alphabet. Your task is to flip each alphabet . If alphabet is lowercase alphabet then flip it to the uppercase else vice-versa. Print the modified string.

**Input:**

The only line of the input is a string.

**Output:**

Modified string.

**Constraints**

* 1≤|*lengthofstring*|≤1000

**Sample Input:**

AbcDEFgh

**Sample Output:**

aBCdefGH

**problem 34:**

Given an array of ‘n’ elements which contains only 1 and 0, count all sub-array which starts and ends with same digit. Print the result.

**Input:**

* First line will contain *n*

 , size of array.

 Next line will contain *n*

* elements of the array.

**Output:**

single integer(count result)

**Constraints**

* 1≤*n*≤500
* array elements: {0,1}

**Sample Input:**

5  
1 1 0 0 1

**Sample Output:**

9

**EXPLANATION:**

Subarrays which starts and ends from same numbers are: {1},{1},{0},{0},{1},{1,1},{0,0},{1,0,0,1},{1,1,0,0,1}. Hence, output is 9.

**Problem 35:**

Given a sentence. Print the words of a sentence in reverse order.

**Input:**

* First line will contain a string of words.

**Output:**

* Modified String

**Constraints**

* 1≤|*lengthofstring*|≤500

**Sample Input:**

cats and dogs

**Sample Output:**

dogs and cats

**problem 36:**

Paul's girlfriend Kim left him for a guy named Vin.Now he hates them even their name initials together in the form of "VK".

He has no problem with "KV" .

Paul has a string **s** .

Paul wants to obtain a string without a substring "VK".

So he makes some moves. In one move he can swap two adjacent letters of the string. It can be easily proved that it's possible for any initial string **s**.

What is the minimum possible number of moves Paul can do?

**Input** -

* The first line - an integer *n* (1 ≤ *n* ≤ 75) — the length of the string.
* The second line - string **s** of length *n* (consists of only uppercase english letters).

**Output** -

* Print one integer, denoting the minimum possible number of moves.

**Sample Input:**

* 7  
  MSVVKVJ

**Sample Output:**

* 2

**Problem 37:**

Shibam is given a string S consisting of only lower characters of the English alphabet. He is asked to compress the string. He decides to compress the string by choosing any one character from the English alphabet and deleting all occurrences of the character from the string. But Shibam is unable to decide which character to choose and compress the string S and he asks you to tell the minimum length of the compressed string.

### Input:

First line will contain **T,** number of testcases.

Each test case will contain a string **S** consisting of only lower case letters of the English alphabet.

### Output

For each test case,print the minimum length of the compressed string.

### Example

**Input:**

2

arqpadparta

mnxprtpvghap

**Output:**

**7**

**9**

**Problem 39:**

Given a list of ‘n’ names find the most frequent name in a list. If two names have same frequency, print the name with higher lexicographical order.

**Input:**

* First line will contain number *n*
* , number of names. Then 'n' names will be entered..

**Output:**

Most frequent name

**Constraints**

* 1≤*n*≤1000

2≤|*lengthofstring*|≤100

**Sample Input1:**

5  
AdityaPriyaKshitijPriyaAnandita

**Sample Output1:**

Priya

**EXPLANATION:**

"Priya" occurs more frequently than other names.

**Problem 40:**

Sachin loves to play with binary numbers as he is very fascinated about how computer computes various calculation and gives different results accordingly. Though he is more fascinated about Quantum computers where every data is stored and evaluated on basis of spin of electrons rather than our traditional computers. But as far now, quantum computing is future of computing world, so his fascination is also limited to traditional computers which work on binary numbers. One day, he wanted to calculate number of ones corresponding to the particular bit of the array elements and if the count is even, then he assigns 1 to that particular bit of the resultant number.

For example, if the array elements are 2, 3, 4, then the result is 2.

As

a1= 00...... 0 0 1 0

a2= 00.......0 0 1 1

a3= 00.......0 1 0 0

----------------------

r = 00.......0 0 1 0

Note that count of only the zeros before the last ones are considered to be non-even.

### Input Format

First line of each test case contains number of test case T.

First line of each test case contains N the number of elements in the given array.

Second line contains N space separated integers.

### Output Format

Print only one integer of each test cases in separate line.

### Constraints:

1<=T<=20

1<=Size of the array<=10^7

1<=Ai<=10^18

### Sample Input

2

3

2 3 4

4

2 3 4 8

### Sample Output

2

2

**Problem 41:**

You are given an expression consisting of numbers and numerical operators plus(+), minus(-) and multiply(\*) only. Your task is simple. Find the result of the expression. Note: Multiplication has a higher precedence than plus and minus. Plus and minus have same precedence, so left-right precedence will be followed in their case.

**Input:**

* The first line consists of the number of testcases, T.
* The following T lines contains one string each, the expression whose value is to be found.

**Output:**

* Print T lines, where each line contains the value of that expression.

**Constraints**

* 1≤*T*≤1000
* The numbers in the expression lies between 0 and 100 (both inclusive).

**Sample Input:**

2

2+3\*6  
3-9+1

**Sample Output:**

20

-5

**Problem 42:**

Dr. Bumble has set up many stations to conduct his nuclear research. However in each of these stations, for doing mathematical calculations he doesn't use the conventional decimal number system. Instead he uses a separate base Xi for the i-th station. In order to represent numbers in a particular station, he uses Xi different symbols. Each of these symbols is a number p where 0≤*p*≤*Xi*

.

For portability of his experiments, he needs to convert the numbers back and forth from station to station. Given a number D in base Xi, your job is to find out the number of symbols (NOT necessarily distinct) needed to represent that number in base Xj.

Note:

ONLY the number of symbols is wanted. That means you need to find out the length of representation of D in Xj.

For every base Xi, it is ensured that log(base 2) of Xi is always an integer.

**Input:**

* The first line consists of two space-separated integers N and Q, the number of stations and the number of queries respectively.
* The next line contains array X, where the value Xi is the base used for station i.
* There are 2\*Q more lines.

**Output:**

* Print Q lines, where each line contains the answer to that query.

**Constraints**

* 1≤*N*,*Q*≤10*e*4

2≤*Xi*≤5000

1≤*i*,*j*≤*N*

1≤|*D*|<=10*e*4

|D| represents the length of D in base i.

Each symbol used to represent D in base i is a number p where 0≤*p*≤*Xi*

.

**Sample Input:**

3 2

2 8 4  
2 3  
0 7 2 1  
3 2  
3 0 2 1 2 0

**Sample Output:**

6

4

**EXPLANATION:**

For the first query, D is in base 8.

(0721)base8 = (013101)base4 therefore, length of 013101 = 6.

For the second query, D is in base 4.

(302120)base4 = (6230)base8 therefore, length of 6230 = 4.

**Problem 43:**

The Spirit of the Sea has held you captive and has agreed to release you if you can do him a favor.

The Spirit has given you N numbered pebbles A[i] in a series, one after the other.

He said that you can choose any random integers X and Y such that 1<=X<=Y<=N, and you can rearrange the pebbles whose indices i fall within the range (X,Y) (both inclusive) (X<=i<=Y) any way you like such that the ENTIRE series becomes symmetric.

The series is said to be symmetric if and only if A[i] = A[n-i] for every index i.

Your job is simple. Find the number of pairs of possible X,Y that exists that satisfies the above criteria.

Note: It is okay to pick X and Y and not change anything in the range and still get a symmetric series.

**Input:**

* The first line contains T, the number of test cases.
* The first line of each test case, contains N, the number of pebbles.
* The next line contains N space separated integers representing the pebbles.

**Output:**

* Print one line for each test case containing the answer to the problem.

**Constraints**

* 1≤*T*≤100

1≤*N*≤10*e*5

1≤*A*[*i*]≤*N*

**Sample Input:**

1

5

1 1 1 1 2

**Sample Output:**

3

**EXPLANATION:**

Valid X,Y pairs are - (1,5) (2,5) and (3,5)

**Problem 44:**

Given an array of size N .You need to find maximum subarray (not necessarily contiguous) which is having its GCD (greatest common divisor) as K .return its length as output.

**Input**

* The first line of the input contains a single integer T denoting the number of test cases. The description of T test cases follows
* The first line of each test case contains a single integer N.
* The second line contains N space-separated integers A1, A2, ..., AN denoting array content.
* the next line contains K.

**Output**

* For each test case, print a single line containing one integer — the maximum size of subarray with GCD K.
* if no such subarray exists print "0" without Quotes

**Constraints**

1<=T<=10000  
1<=N<=10000  
1<=arr[i]<=50000  
1<=k<=50000

**Example**

**Input:**

2

3

1 2 3

3

5

25 500 11 3 15

5

**Output:**

1

3

**Problem 45:**The Famous pirate Captain jack sparrow is known for his wit and smartness.  
once he was captured by a group of pirate called TheKeeron and put in the jail with so many other pirates.  
the next day they have to fight a competition in which the pirate who finds the Key block minimaly will get freedom from the jail.  
each of the prisoners will be thrown in a plane of dimension N\*M consisting of blocks (blocks can be identical) with some height.  
each block is represented by a small case alphabet and height of the block is given by the letter itself i.e. the order in which it occurs in the english alphabets. the prisoners can be thrown at any random position in the grid and he/she need to reach at a certain block Key block specified by the TheKeerons as an alphabet. the prisoner can move one step up or down or left or right in order to reach Key block .  
but here is a catch if a prisoner moves to a block of lesser height he or she will be killed immediatly.  
  
help captain jack sparrow to find a way out such that it takes minimum step to reach any one of the key block from all possible position in grid if exists.

### Input

first line contains T the number of test cases  
first line of each test case contains two integers N and M  
next N lines will contain M letters each without spaces   
after these N lines the Key will be given in the form of a single character in next line

### Output

output a number matrix of size N\*M   
each number is the minimum step to reach the Key from corrosponding position   
if it is not possible to survive from current position print -1 at that position.  
the value in each row is seprated by space.

### Constraints

1<=T<=1000  
1<=N,M<=1000  
a<=key<=z

### Example

**Input:**

1

3 3

abc

dgs

sbx

s

**Output:**

2 2 1

1 1 0

0 1 -1

**Problem 46:**

Suppose you are living in 2098, NASA already reached on Mars and established several colonies over there but water supply system is not so good implemented.  
so NASA hired you to solve this problem you are given N pairs of cordinates(x,y) representing N colonies numbered 1,2,3,4,.......,N.  
And already implemented K connections (each given as a pair of coloney's number like if a pipeline is there between colony 3 and 4 then it is represented as (3,4) or (4,3) ).  
  
However, NASA want to guarantee that every Colony should be connected from every other colony either directly or via some other colony. the cost of pipeline between any two colony (let say colony i and j) will be **(Xj-Xi)^2 + (Yj-Yi)^2** .  
you need to minimize the cost of implementing new pipelines and connect all the colonies either directly or via some other colony.

**Input**

Input description.

* The first line of the input consists of an integer T indicating the number of test cases T test cases as follow
* first line of each test case consists of N i.e. total number of colonies next N lines consists of two integer each separated by a space i.e. X and Y coordinate of colony
* after these N line next line consists an integer K representing total already implemented pipelines
* next K lines consists of two integers separated by a space.These two integers give a pair of colony numbers which are already connected by a pipeline. each test case is seprated by a blank line.

**Output**

Output description.

* print each new connection on a new line as a pair of colonies number
* these pairs are sorted in increasing order on the basis of cost
* the first number in each pair can't be greater than the second number.
* if no new connection required print "well established" without quotes on a new line
* output of each test case is seprated by a blank line.

**Example**

**Sample Input:**

1

6

4 7

0 8

9 1

5 12

3 7

4 11

2

1 4

2 5

**Output:**

1 5

4 6

1 3

**Problem 47:**

Given a value **N**, maximize the value of **(a+b)** such that **(a\*a-b\*b = N)**.   
**Note: The value of N is odd. a and b are integers.**

**Input**

The first line consists of test case T. Each testcase consists of the value of N.

**Output**

Print the value of max(a+b).

**Constraints**

* **1** ≤ **T** ≤ **100000**
* **1** ≤ **N** ≤ **1018**

**Example**

**Input:**

1

1

**Output:**

1

**Explanation**

The value of a2 - b2 is 1. The maximum value occurs when a=1 and b=0. Thus, a+b = 1.

**Problem 48:**

Given two numbers x and y, find the squares of x, x+1, x+2, ... ,x+n where x+n=y. After calculating the squares of all those numbers, find the difference between every two consecutive squares. You will get n such numbers. Now, square the n numbers that you get and add them. Display the result mod 109+7.

**Note that always x<y.**

**Input**

The first line of input contains an integer T denoting the number of testcases. Each test case contains two space-separated integers x and y.

**Output**

Print the result mod 109+7 in a new line.

**Constraints**

* **1** ≤ **T** ≤ **105**
* **0** ≤ **x,y** ≤ **105**

**Example**

**Input:**

1

1 4

**Output:**

83

**Explanation**

There are 4 numbers. The square of 1 is 1, square of 2 is 4, square of 3 is 9 and square of 4 is 16.  
Now calculate the difference between every two consecutive squares. Now,we have 3, 5 and 7. Square each of them and add them i.e. 3^2 + 5^2 + 7^2 = 9 + 25 + 49 = 83.

**Problem 49;**

Given Two Numbers N and K. Find the number of pairs (a,b) such that a%b == K where 1 <= a,b<= N.

**Input**

The first line consists of T test cases. Each of the testcase consists of two integers N and K separated by space.

**Output**

Print the number of pairs in new line for each test case.

**Constraints**

* **1** ≤ **T** ≤ **100**
* **1** ≤ **N** ≤ **100000**
* **1** ≤ **K** ≤ **100000**

**Example**

**Input:**

1

4 2

**Output:**

2

**Explanation**

The pairs of (a,b) that satisfies the condition a%b==2 are: (2,3) and (2,4).

**Problem 50:**

A digit string of length **K** is defined as a string of **K** digits, for example : 7017, 1044, 0172, 3001 are digit strings where K = 4. Find the number of digit strings of length **K** that can be made where there will be an even number of zeros modulus 1000000007 (109 + 7)

**Note: Also consider 0 zero's as even.**

**Input**

The first line of input consists of one integer **T**i.e the number of test cases.  
The next **T** lines contains single integer **K** denoting the length of digit string.

**Output**

For each test case print the number of digit strings having even number of zeros modulus 1000000007 (109 + 7) in a new line.

**Constraints**

* **1** ≤ **T** ≤ **104**
* **1** ≤ **K** ≤ **1018**

**Example**

**Input:**

2

1

2

**Output:**

9

82

**Explanation**

**Example case 1.**For K = 1, We can have 0/1/2....9, except the case 0, we have even number of zeros (i.e 0 zeros).   
For K = 2, we have 00 to 99, number of digit strings having even number of zeroes are 82.

**Problem 51:**

NITR is organizing a sports fest. The students can be assigned jersey numbers from **1 to N**. The jersey numbers of the students may be repeated. Now, the coach instructs the students to stand in a queue based on their jersey numbers such that the jersey numbers of the students standing in queue are either in non-decreasing or in non-increasing order. Find the total number of such possible combinations.

**Input**

The first line contains an integer **T** i.e. number of testcases.

Each testcase contains single line containing **N**.

**Output**

Print the number of possible condition modulo 109+7.

**Constraints**

* **1** ≤ **T** ≤ **105**
* **1** ≤ **N** ≤ **105**

**Example**

**Input:**

2

1

2

**Output:**

1

4

**Explanation**

**Test case 1:** For N=1, there is only one possible combination i.e. 1. **Test case 2:** For N=2, there are 4 possible combination i.e. 1 1, 1 2, 2 1, 2 2,.

**Problem 52:**

Mahesh and Ritesh are two friends. There is a technical event going on at NITR called TechX. The co-ordinators of TechX came up with a brainstorming game which they named **Brain-Edens** having a whopping prize money. Mahesh and Ritesh are in the final round of the game. The rules of the game go like this:

* It is played between two players.
* Initially a number **N (N>0)** is displayed to them.
* Each of the player can select a digit **D** from the digits of the number **N** and replace it with another digit **K ( 0<= K < D )**.
* The player who plays the last move such that all the digits becomes**0** is the winner of the game.

Since both Mahesh and Ritesh have reached the final, assuming that they both play the game optimally. Given a range of numbers from **[L, R] (both L & R are inclusive)**, Find the number of games that Mahesh and Ritesh will win.

**Input**

The first line of the input contains single integer **T**, the number of test cases. For each test case, there is a single line containing two space-separated integers **L R** and one character **C**. Where **C** can be **'M’ or ‘R’**( **M** representing **Mahesh** and **R** representing **Ritesh**) and player **C** plays the first move.

**Output**

For each test case print the number of games which Mahesh and Ritesh will win in a single line separated by space.**The first number should represent the number of games Mahesh wins and the second number represents the number of games Ritesh wins**.

**Constraints**

* **1** ≤ **T** ≤ **104**
* **1** ≤ **L, R** ≤ **1018**

**Example**

**Input:**

2

101 110 M

101 110 R

**Output:**

8 2

2 8

**Explanation**

When Mahesh plays first ,the second player Ritesh will win on 2 numbers 101 and 110. Rest Mahesh will win.   
When Ritesh plays first, the second player Mahesh will win on 2 numbers 101 and 110. Rest Ritesh will win.