A. Palindrome subsequence

In mathematics, a subsequence is a sequence that can be derived from another sequence by deleting some elements without changing the order of the remaining elements. For example, the sequence <A, B, D> is a subsequence of <A, B, C, D, E, F>.
(http://en.wikipedia.org/wiki/Subsequence)

Given a string S, your task is to find out how many different subsequence of S is palindrome. Note that for any two subsequence X = $<S_{x1}, S_{x2}, ..., S_{xk}>$ and Y = $<S_{y1}, S_{y2}, ..., S_{yk}>$, if there exist an integer i (1<=i<=k) such that xi != yi, the subsequence X and Y should be consider different even if $S_{xi} = S_{yi}$. Also two subsequences with different length should be considered different.

Input

The first line contains only one integer T (T<=50), which is the number of test cases. Each test case contains a string S, the length of S is not greater than 1000 and only contains lowercase letters.

Output

For each test case, output the case number first, then output the number of different subsequence of the given string, the answer should be module 10007.

Sample Input

```
4
a
aaaaa
goodafternooneveryone
welcometoooxxourproblems
```

Sample Output

```
Case 1: 1
Case 2: 31
Case 3: 421
Case 4: 960
```

B. Who's Aunt Zhang

Aunt Zhang, well known as 张阿姨, is a fan of Rubik’s cube. One day she buys a new one and would like to color it as a gift to send to Teacher Liu, well known as 刘老师. As Aunt Zhang is so ingenuity, she can color all the cube’s points, edges and faces with K different color. Now Aunt Zhang wants to know how many different cubes she can get. Two cubes are considered as the same if and only if one can change to another ONLY by rotating the WHOLE cube. Note that every face of Rubik’s cube is consists of nine small faces. Aunt Zhang can color arbitrary color as she like which means that she doesn’t need to color the nine small faces with same color in a big face. You can assume that Aunt Zhang has 74 different elements to color. (8 points + 12 edges + 9*6=54 small faces)

Aunt Zhang can color all these small faces with arbitrary color

Every face of Rubik’s cube is consists of nine small faces.

Input

The first line of the date is an integer T, which is the number of the text cases.
Then T cases follow, each case contains one integer K, which is the number of colors. T<=100, K<=100.

Output

For each case, you should output the number of different cubes.
Give your answer modulo 10007.

Sample Input

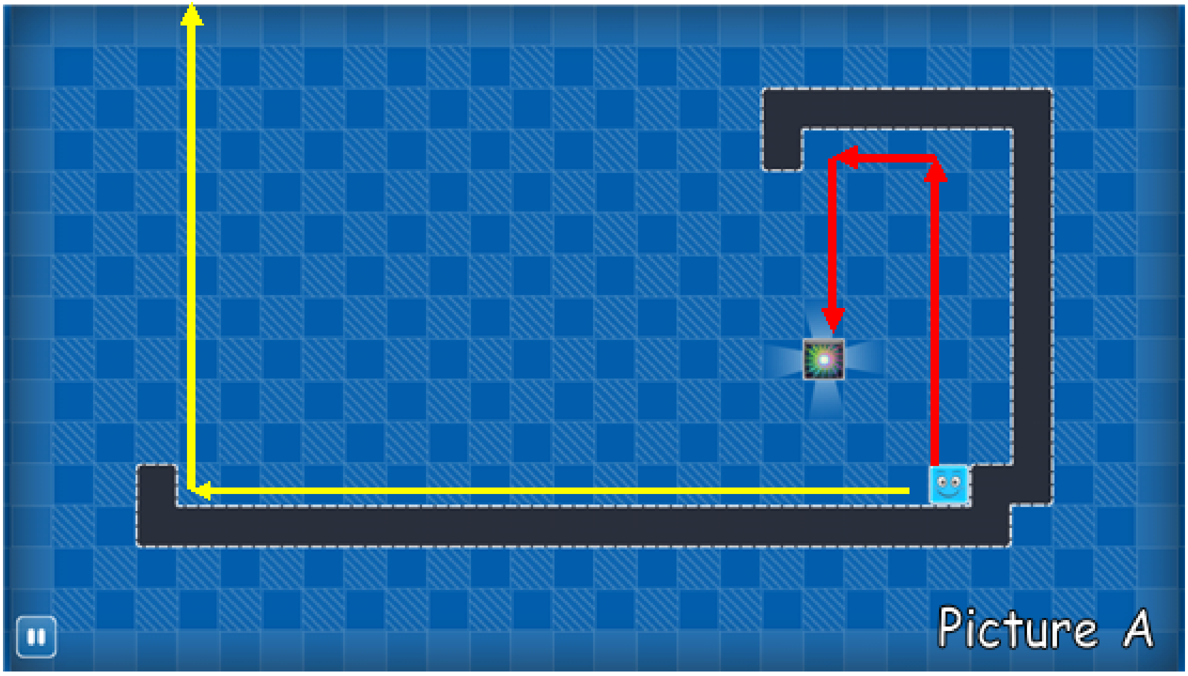
```
3
1
2
3
```

Sample Output

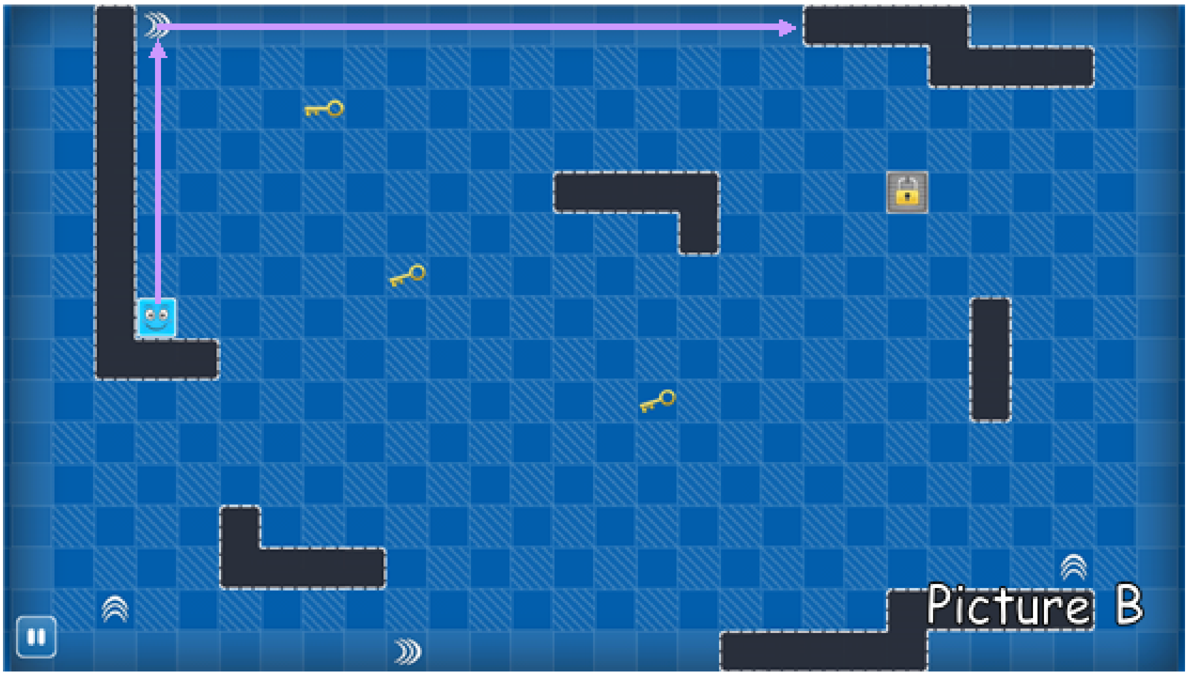
```
Case 1: 1
Case 2: 1330
Case 3: 9505
```

C. Swipe Bo

“Swipe Bo” is a puzzle game that requires foresight and skill.
The main character of this game is a square blue tofu called Bo. We can swipe up / down / left / right to move Bo up / down / left / right. Bo always moves in a straight line and nothing can stop it except a wall. You need to help Bo find the way out.
The picture A shows that we needs three steps to swipe Bo to the exit (swipe up, swipe left, swipe down). In a similar way, we need only two steps to make Bo disappear from the world (swipe left, swipe up)!



Look at the picture B. The exit is locked, so we have to swipe Bo to get all the keys to unlock the exit. When Bo get all the keys, the exit will unlock automatically .The exit is considered inexistent if locked. And you may notice that there are some turning signs, Bo will make a turn as soon as it meets a



turning signs. For example, if we swipe Bo up, it will go along the purple line.
Now, your task is to write a program to calculate the minimum number of moves needed for us to swipe Bo to the exit.

Input

The input contains multiple cases, no more than 40.
The first line of each test case contains two integers N and M (1≤N, M≤200), which denote the sizes of the map. The next N lines give the map's layout, with each line containing M characters. A character is one of the following: '#': represents the wall; 'S' represents the start point of the Bo; 'E' represents the exit; '.' represents an empty block; 'K' represents the key, and there are no more than 7 keys in the map; 'L','U','D','R' represents the turning sign with the direction of left, up, down, right.

Output

For each test case of the input you have to calculate the minimal amount of moves which are necessary to make Bo move from the starting point to the exit. If Bo cannot reach the exit, output -1. The answer must be written on a single line.

Sample Input

```
5 6
######
#....#
.E...#
..S.##
.#####
5 6
######
#....#
.....#
SEK.##
.#####
5 6
######
#....#
....K#
SEK.##
.#####
5 6
######
#....#
D...E#
S...L#
.#####
```

Sample Output

```
3
2
7
-1
```

D. Strongly connected

Give a simple directed graph with N nodes and M edges. Please tell me the maximum number of the edges you can add that the graph is still a simple directed graph. Also, after you add these edges, this graph must NOT be strongly connected.

A simple directed graph is a directed graph having no multiple edges or graph loops.
A strongly connected digraph is a directed graph in which it is possible to reach any node starting from any other node by traversing edges in the direction(s) in which they point.

Input

The first line of date is an integer T, which is the number of the text cases.
Then T cases follow, each case starts of two numbers N and M, 1<=N<=100000, 1<=M<=100000, representing the number of nodes and the number of edges, then M lines follow. Each line contains two integers x and y, means that there is a edge from x to y.

Output

For each case, you should output the maximum number of the edges you can add.
If the original graph is strongly connected, just output -1.

Sample Input

```
3
3 3
1 2
2 3
3 1
3 3
1 2
2 3
1 3
6 6
1 2
2 3
3 1
4 5
5 6
6 4
```

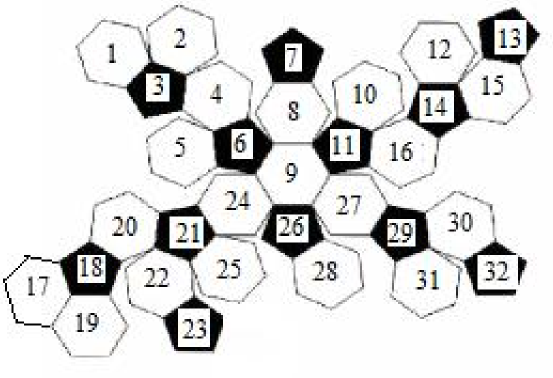
Sample Output

```
Case 1: -1
Case 2: 1
Case 3: 15
```

E. Painting the Football

The football, well known as a worldwide popular sport, is made of 12 regular pentagons and 20 regular hexagons.

In this problem, L has to color a new football. The football is totally white in the beginning and L has to color some of its faces into black (maybe zero). Look at the picture below, the 32 faces of a football are numbered from 1 to 32. Two faces are considered connected if and only if they share a same side such like 12 and 13 as well as 29 and 30. Each step L can choose some connected faces of the football and color all these faces into black or white no matter what color it used to be. For example, L can color the faces 2, 3, 4 and 5 at the same time, but he can't color the faces 26 and 29 at the same time.



Now give the target state of the football, your task is calculating the minimum steps that L needs to do.

Input

The first line of the date is an integer T, which is the number of the text cases.
Then T cases follow describe a target state. Each case contains 32 integers in a line. If the ith number in this line is 1, it means that the face with index i need to color to black, otherwise it need to color to white.

Output

For each test case, output the case number first, then output minimum steps L needs to do to color the football to the target state.

Sample Input

```
2
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 0 1 0 0 1 1 0 0 0 1 0 1 1 0 0 0 1 0 0 1 0 1 0 0 1 0 0 1 0 0 1
```

Sample Output

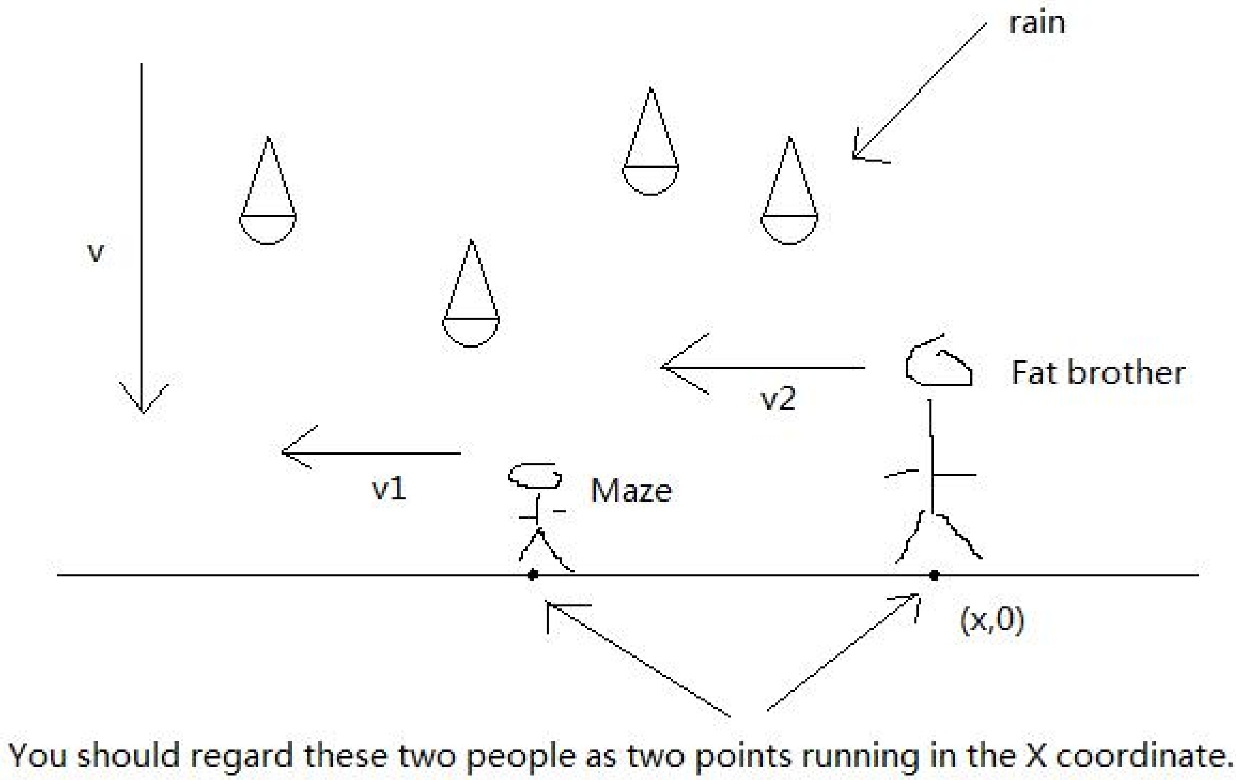
```
Case 1: 1
Case 2: 2
```

F. Rain on your Fat brother

After retired form the ACM/ICPC competition, Fat brother starts his civil servant's life with his pretty girl friend Maze. As far as we known for this holy job, we can imagine how a decadent life they are dealing with!

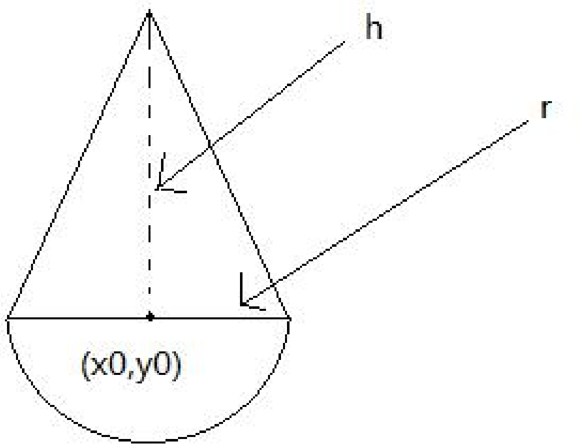
But one day, Fat brother and Maze have a big quarrel because of some petty things and Maze just run away straight from him. It's raining cats and dogs outside, our hero Fat brother feel very worried about the little princess so he decide to chase her. As Maze is a tsundere girl, she would feel angry when she touches the rain until she meets the Fat brother.

To simplify this problem, we can just consider each person as a point running along the X coordinate from right to left and the rain as a combination of an isosceles triangle and a half round. The speed of Maze is v1 unit per second and the speed of Fat brother is v2 unit per second (v1 < v2). The place where they have a quarrel is (x, 0) and Fat brother start to chase Maze after T second. You can assume that the rain is doing the uniform linear motion (drop with the same speed forever). Your task is calculating how long (time) the Maze is in the rain. The Maze is considered in the rain even if the point representing her is just touch the border. See the picture for more detail.



Input

The first line contains only one integer T (T<=200), which is the number of test cases. For each test case, first line comes five positive integer v_1, v_2, v, t, x ($v_1<v_2$). v_1 is the speed of Maze, v_2 is the speed of Fat brother, v is the speed of the rain, you can assume that all rain is in a same speed, t means Fat brother starts to chase Maze after t second, x means they have a quarrel in (x, 0). Then a line with an integer n means that there is n rain begin to drop when Maze start running, 1<=n<=1000. Then n lines describe the rain. Each line contains four integers x_0, y_0, r, h. (x_0, y_0) is the center of the circle, r is the radius of the circle, h is the height of the triangle. All the number mentioned before except x_0 are positive and no large than 1000. x_0 is no large than 1000 and no less than -1000. Note that the point (x, 0) may in the rain in the beginning. Two rains may intersect with each other. See the picture for more detail.



Output

For each test case, output the case number first, then output how long (time) Maze is in the rain, round to 4 digits after decimal point.

Sample Input

```
4
1 2 1 100 1
1
1 1 1 1
1 2 1 100 1
1
2 1 1 1
1 2 1 100 1
1
-9 9 10 10
2 3 1 100 1
1
-9 9 10 10
```

Sample Output

```
Case 1: 1.0000
Case 2: 0.0000
Case 3: 12.0534
Case 4: 8.0428
```

G. Group

There are n men ,every man has an ID(1..n).their ID is unique. Whose ID is i and i-1 are friends, Whose ID is i and i+1 are friends. These n men stand in line. Now we select an interval of men to make some group. K men in a group can create K*K value. The value of an interval is sum of these value of groups. **The people of same group's id must be continuous.** Now we chose an interval of men and want to know there should be how many groups so the value of interval is max.

Input

First line is T indicate the case number.
For each case first line is n, m(1<=n ,m<=100000) indicate there are n men and m query.
Then a line have n number indicate the ID of men from left to right.
Next m line each line has two number L,R(1<=L<=R<=n),mean we want to know the answer of [L,R].

Output

For every query output a number indicate there should be how many group so that the sum of value is max.

Sample Input

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

Sample Output

```
1
2
```

H. Hehe

As we all know, Fat Brother likes MeiZi every much, he always find some topic to talk with her. But as Fat Brother is so low profile that no one knows he is a rich-two-generation expect the author, MeiZi always rejects him by typing “hehe” (wqnmlgb). You have to believe that there is still some idealized person just like Fat Brother. They think that the meaning of “hehe” is just “hehe”, such like “hihi”, “haha” and so on. But indeed sometimes “hehe” may really means “hehe”. Now you are given a sentence, every “hehe” in this sentence can replace by “wqnmlgb” or just “hehe”, please calculate that how many different meaning of this sentence may be. Note that “wqnmlgb” means “我去年买了个表” in Chinese.

Input

The first line contains only one integer T, which is the number of test cases.Each test case contains a string means the given sentence. Note that the given sentence just consists of lowercase letters.

T<=100

The length of each sentence <= 10086

Output

For each test case, output the case number first, and then output the number of the different meaning of this sentence may be. Since this number may be quite large, you should output the answer modulo 10007.

Sample Input

```
4
wanshangniyoukongme
womenyiqichuqukanxingxingba
bulehehewohaiyoushi
eheheheh
```

Sample Output

```
Case 1: 1
Case 2: 1
Case 3: 2
Case 4: 3
```

I. K-string

Given a string S. K-string is the sub-string of S and it appear in the S at least K times.It means there are at least K different pairs (i,j) so that $S_i, S_{i+1} \ldots S_j$ equal to this K-string. Given m operator or query:1.add a letter to the end of S; 2.query how many different K-string currently.For each query ,count the number of different K-string currently.

Input

The input consists of multiple test cases.
Each test case begins with a line containing three integers n, m and K(1<=n,K<=50000,1<=m<=200000), denoting the length of string S, the number of operator or question and the least number of occurrences of K-string in the S.
The second line consists string S,which only contains lowercase letters.
The next m lines describe the operator or query.The description of the operator looks as two space-separated integers t c (t = 1; c is lowercase letter).The description of the query looks as one integer t (t = 2).

Output

For each query print an integer — the number of different K-string currently.

Sample Input

```
3 5 2
abc
2
1 a
2
1 a
2
```

Sample Output

```
0
1
1
```

J. Fliping game

Alice and Bob are playing a kind of special game on an N*M board (N rows, M columns). At the beginning, there are N*M coins in this board with one in each grid and every coin may be upward or downward freely. Then they take turns to choose a rectangle (x_1, y_1)-(n, m) ($1 \le x_1 \le n$, $1 \le y_1 \le m$) and flips all the coins (upward to downward, downward to upward) in it (i.e. flip all positions (x, y) where $x_1 \le x \le n$, $y_1 \le y \le m$)). The only restriction is that the top-left corner (i.e. (x_1, y_1)) must be changing from upward to downward. The game ends when all coins are downward, and the one who cannot play in his (her) turns loses the game. Here's the problem: Who will win the game if both use the best strategy? You can assume that Alice always goes first.

Input

The first line of the date is an integer T, which is the number of the text cases.
Then T cases follow, each case starts with two integers N and M indicate the size of the board. Then goes N line, each line with M integers shows the state of each coin, 1<=N,M<=100. 0 means that this coin is downward in the initial, 1 means that this coin is upward in the initial.

Output

For each case, output the winner's name, either Alice or Bob.

Sample Input

```
2
2 2
1 1
1 1
3 3
0 0 0
0 0 0
0 0 0
```

Sample Output

```
Alice
Bob
```