Problem A.

Description

There are n flowerpots in Daniel's garden. These flowerpots are placed in n positions, and these n positions are numbered from 1 to n. Each flower is assigned an aesthetic value. The aesthetic values vary during different time of a day and different seasons of a year. Naughty Daniel is a happy and hardworking gardener who takes pleasure in exchanging the position of the flowerpots.

Friends of Daniel are great fans of his miniature gardens. Before they visit Daniel's home, they will take their old-fashioned cameras which are unable to adjust the focus so that it can give a shot of exactly **k consecutive flowerpots**. Daniel hopes his friends enjoy themselves, but he doesn't want his friend to see all of his flowers due to some secret reasons, so he guides his friends to the best place to catch the most beautiful view in the interval [x, y], that is to say, to **maximize the sum of the aesthetics values of the k flowerpots** taken in one camera shot when they are only allow to see the flowerpots between position x to position y.

There are m operations or queries are given in form of (p, x, y), here p = 0, 1 or 2. The meanings of different value of p are shown below.

1. $p = 0$ set the aesthetic value of the pot in position x as y. ($1 <= x <= n$; $-100 <= y <= 100$)
2. $p = 1$ exchange the pot in position x and the pot in position y. ($1 <= x, y <= n$; x might equal to y)
3. $p = 2$ print the maximum sum of aesthetics values of one camera shot in interval $[x, y]$. ($1 <= x <= y <= n$; We guarantee that $y-x+1>=k$)

Input

There are multiple test cases.

The first line of the input file contains only one integer indicates the number of test cases.

For each test case, the first line contains three integers: n, m, k (1 <= k <= n <= 200,000; 0 <= m <= 200,000).

The second line contains n integers indicates the initial aesthetic values of flowers from position 1 to position n. Some flowers are sick, so their aesthetic values are negative integers. The aesthetic values range from -100 to 100. (**Notice**: The number of position is assigned 1 to n from left to right.)

In the next m lines, each line contains a triple (p, x, y). The meaning of triples is mentioned above.

Output

For each query with p = 2, print the maximum sum of the aesthetics values in one

shot in interval [x, y].

Sample Input

```
1
5 7 3
-1 2 -4 6 1
2 1 5
2 1 3
1 2 1
2 1 5
2 1 4
0 2 4
2 1 5
```

Sample Output

```
4
-3
3
1
6
```

Problem B.

Description

The massive tsunami that struck the coastal city has washed away many of inhabitants and facilities there. After the tsunami, the power supply facilities of the coastal city are completely destroyed. People are in panic in the dark night. Doubts remain over whether the communities will be able to rebuild the city. To calm people down, the heads of the city are planning to rebuild the city to start with the recovery of the power supply facilities.

The coastal city consists of *n* communities which are numbered from 1 to n. To save the electric cables, *n-1* cables has been used to connect these communities together, so that each pair of communities is able to transfer electronic energy mutually.

The heads of the city decide to set a power station in one of the communities. There is thermal energy loss along the cables. Each cable has a resistance of *R* ohm. The total thermal energy loss is the sum of I^2R_i. Here R_i is the total residence along the path between the i^{th} community and the power station, and *I* is a constant. They are troubling their head on the issue of where to set the power station to make the total thermal energy loss minimized.

Input

There are multiple test cases.

The first line contains one integer indicating the number of test cases.

For each test case, the first line contains three positive integers *n*, *I* and R, indicating the number of communities, the above mentioned constant and the residence of each cable. ($3 \le n \le 50000$, $1 \le I \le 10$, $1 \le R \le 50$)

The next *n-1* lines, each describe a cable connection by two integers *X*, *Y*, which indicates that between community *X* and community *Y*, there is a cable.

Output

For each test case, please output two lines.

The first line is the minimum total thermal energy loss.

The second line is all the optional communities in ascending order.

You are requested to leave a blank line after each test case.

Sample Input

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

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

Sample Output

5
2

14
2 3

Problem C.

Description

In Chinese history, Zhuge Liang, prime minister of Shu in three kingdoms period, is regarded as the embodiment of wisdom. When he was dying he passed a book to his apprentice Jiang Wei privately. This book recorded the introduction and specification of a most powerful weapon at that time, called Chinese repeating crossbow or Zhuge repeating crossbow (Figure 1). This weapon can shoot many arrows in a very short time and makes enemies very hard to defense it.

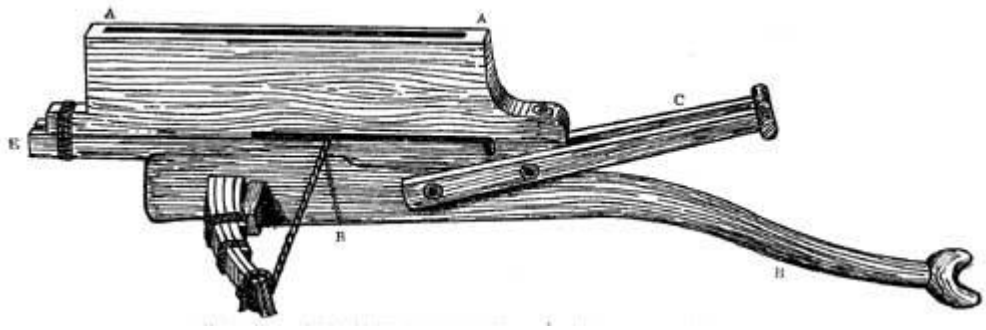

Figure 1 Chinese Repeating Crossbow

Later on, Jiang Wei built a repeating crossbow according to the book and he wanted to know exactly about its power. He came to the center of a test field. The test field was ragged with several extreme high straw walls. Jiang Wei wanted to choose a direction, shot through as many straw walls as he can by his new weapon.

The problem given to you is quite simple: assuming that the repeating crossbow can shot through any numbers of straw walls, please help Jiang Wei to choose a certain direction that he can shot through maximum number of walls in one shot. The walls can be considered as line segments, and if an arrow touches the end points of a wall, it's also called "shoot through". The straw walls can intersect or overlap with each other, and Jiang Wei may possibly stand extremely close to one of the straw wall.

Input

The first line of the input contains an integer T (T<=10) representing the number of test cases.

In each test case, the first line contains an integer N (0<N<=1500) representing the number of straw walls on the field. Each of the following N lines contains four integer numbers x_1, y_1, x_2, y_2， which describes the end point (x_1, y_1) and (x_2, y_2) of a straw wall. The last line of the test case contains two integer (x, y) representing the position of Jiang Wei. All the coordinates are integer numbers and in the range of [-10000, 10000].

Output

For each test case, output a single integer representing the maximum number of

straw walls can be shot through in one shot.

Sample Input

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

Sample Output

```
2
2
```

Problem D.

Description

CC and MM arrive at a beautiful city for sightseeing. They have found a map of the city on the internet to help them find some places to have meals. They like buffet restaurants (self-service restaurants) and there are n such restaurants and m roads. All restaurants are numbered from 1 to n. Each road connects two different restaurants. They know the price of every restaurant. They go by taxi and they know the taxi fee of each road.

Now they have Q plans. In each plan, they want to start from a given restaurant, pass none or some restaurants and stop at another given restaurant. They will have a meal at one of those restaurants. CC does not want to lose face, so he will definitely choose the most expensive one among the restaurants which they will pass (including the starting one and the stopping one). But CC also wants to save money, so he want you to help him figure out the minimum cost path for each plan.

Input

There are multiple test cases in the input.

For each test case, the first line contains two integers, n, m(1<=n<=1000, 1<=m<=20000),meaning that there are n restaurants and m roads.

The second line contains n integers indicating the price of n restaurant. All integers are smaller than 2×10^9.

The next m lines, each contains three integers: x, y and z(1<=x, y <=n, 1<=z<=2×10^9), meaning that there is a road between x and y, and the taxi fee of this road is z.

Then a single line containing an integer Q follows, meaning that there are Q plans (1<=Q<=20000).

The next Q lines, each contains two integers: s and t (1<=s, t <= n) indicating the starting restaurant and stopping restaurant of each plan.

The input ends with n = 0 and m = 0.

Output

For each plan, print the minimum cost in a line. If there is no path from the starting restaurant to the stopping restaurant, just print -1 instead.

Print a blank line after each test case.

Sample Input

```
6 7
1 2 3 4 5 6
1 2 1
2 3 2
3 4 3
```

4 5 4
1 5 5
2 5 2
1 4 3
5
1 4
2 3
1 5
3 5
1 6
2 1
10 20
1 2 5
1
1 2
0 0

Sample Output

7
5
8
9
-1

25

Problem E.

Description

There is a special chess game. In the game, two people play with go pieces (“x” and “o”) on a 4×4 go board. The “x” piece plays first, and players alternate in placing their pieces on an empty cell. The winner is the first player to get an unbroken row of four pieces horizontally, vertically, or diagonally, as shown below:

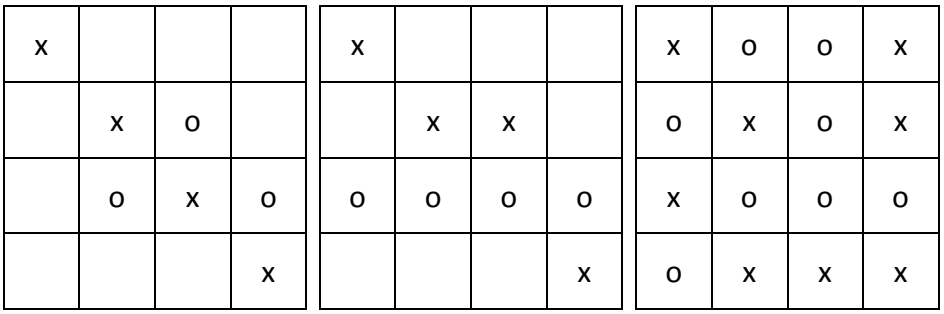

Figure 1 Figure 2 Figure 3

In Figure 1, player with piece ‘x’ win the game.
In Figure 2, player with piece ‘o’ win the game.
In Figure 3, there is a tie.

XXX often plays that game with his girlfriend. Sometimes he wants to win the game in order to prove his cleverness. Sometimes he wants to lose the game to let his girlfriend happy. Sometimes he wants to end in a tie (which means that no one wins when there is no empty cell on the board), so that the relationship between his girlfriend and him can be improved.

Here is the question: given the status of middle stage of the board, judge whether XXX can get the result he expected whatever how his girlfriend places her pieces later on.

Input

The input begins with a line containing an integer, indicating the number of test cases. There are no more than 100 test cases.

For each case, the first line is either “WIN”, “LOSE” or “TIE”, indicating the expectation result of XXX. The next four lines give a 4*4 matrix indicating the status of middle stage of the board. The matrix is formed with the character “x” (“x” piece), “o” (“o” piece) and“.” (empty cell). There are 6 to 10 pieces on the board. The number of “x” pieces is equals to or one more than the number of “o” pieces. It is XXX’s turn to place the piece. It is promised that no one has won the game in the given board.

Output

For each test case, output a string “YES” or “NO” in a line to tell XXX if he can

achieve his expectation.

Sample Input

```
3
LOSE
.o.x
.o.o
x...
.x..
WIN
.o..
xxoo
x..o
x..x
TIE
...o
xo.x
x.xo
o...
```

Sample Output

```
NO
NO
YES
```

Problem F.

Description

In the Christian religion, the Trinity is the union of the Father, the Son, and the Holy Spirit in one God. Recently in a far-far-away country, a new word "Hrinity" was created and became very popular. "Hrinity" means "The son is the father, and the father is the son." But the word "Hrinity" has nothing to do with God or any religion. It's about a writer and his son.

When the son was in high school, he failed all exams of all courses. As a none famous writer, the son's worrying father carried out a bold plan: he wrote a long novel and declared that it's his 16 year old son's work. An idiot kid can write a long novel? That made a press interested and the press published the novel. Since then, the son got famous and rich, and his father has been keep writing novels and articles on his son's name.

But the father doesn't trust his son because his son is a punk. Afraid of being treated badly by his son when becoming old, the father embedded "text finger prints" in all the novels and articles. If the son treats him badly, the father will stand out and declare that his son is a fake writer. The father can point out the "text finger prints" in those works to prove that he actually is the author. A text finger print is a delicate sentence which if you add、delete or change the punctuations in it, it's meaning will become totally different. In all his works, the father write many text finger prints whose meaning can be changed into something like "my father wrote this article"、"I am a fake writer", etc. In case of forgetting where the finger prints are, the father needs a computer program to find out how many finger prints are there in a given article. He offers $20,000,000 to buy the program. Do you want this money?

To simplify the problem, we assume that the articles are all written in capital English letters and without blanks.

Input

There are multiple test cases. The first line in the input is an integer T (T<= 15) indicating the number of test cases.

For each test case:

The first line is a integer n(0 < n <= 2500) indicating the number of text finger prints.

Then n lines follows, each represents a text finger print. It’s guaranteed that these n strings are all different. A finger print at least consists of one letter.

The last line of a test case is the article.

The text finger prints and the article may be described in a compressed format. A compressed string consists of capital letters and “compressors”. A “compressor” is in the following format:

[qx]

q is a number(0 < q <= 5,000,000)and x is a capital letter. It means q consecutive letter xs in the original uncompressed string. For example, [6K] means ‘KKKKKK’ in the original string. So, if a compressed string is like:

AB[2D]E[7K]G

It actually is ABDDEKKKKKKKG after decompressed to original format.

The length of the article is at least 1 and at most 5,100,000, no matter in the compressed format or after it is decompressed to original format. The length of a text finger print is no more than 1,100, no matter compressed or original.

Output

For each test case, print an integer K in a line meaning that the article includes K text finger prints. PLEASE NOTE: If finger print s1 is a sub string of finger print s2 and s2 is included in the article, then s1 doesn't count (s1 can be regarded as doesn't exists). Multiple appearances of a finger print in the article are just counted as one.

Sample Input

```
4
2
AB
DCB
DACB
3
A
AB
ABC
DABC
2
[2A]
[3A]B
[5A]B[4A]B
3
AB
CD
EF
ABCDEF
```

Sample Output

```
0
1
1
3
```