The 15th Zhejiang Provincial Collegiate Programming Contest

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Contest Session

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This problem set should contain 13 (thirteen) problems on 17 (seventeen) numbered pages. Please inform a runner immediately if something is missing from your problem set.

Prepared by SUA Programming Contest Problem Setter Team.
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SUA

Problem A. Peak

A sequence of n integers $a_1, a_2, \ldots, a_n$ is called a peak, if and only if there exists exactly one integer k such that $1 < k < n$, and $a_i < a_{i+1}$ for all $1 \le i < k$, and $a_{i-1} > a_i$ for all $k < i \le n$.

Given an integer sequence, please tell us if it's a peak or not.

Input

There are multiple test cases. The first line of the input contains an integer T, indicating the number of test cases. For each test case:

The first line contains an integer n ($3 \le n \le 10^5$), indicating the length of the sequence.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 2 \times 10^9$), indicating the integer sequence.

It's guaranteed that the sum of n in all test cases won't exceed 10^6.

Output

For each test case output one line. If the given integer sequence is a peak, output "Yes" (without quotes), otherwise output "No" (without quotes).

Example

standard input	standard output
7 5 1 5 7 3 2 5 1 2 1 2 1 4 1 2 3 4 4 4 3 2 1 3 1 2 1 3 2 1 2 5 1 2 3 1 2	Yes No No No Yes No No

Problem B. King of Karaoke

It's Karaoke time! DreamGrid is performing the song *Powder Snow* in the game *King of Karaoke*. The song performed by DreamGrid can be considered as an integer sequence $D_1, D_2, \dots, D_n$, and the standard version of the song can be considered as another integer sequence $S_1, S_2, \dots, S_n$. The score is the number of integers i satisfying $1 \le i \le n$ and $S_i = D_i$.

As a good tuner, DreamGrid can choose an integer K (can be positive, 0, or negative) as his tune and add K to **every** element in D. Can you help him maximize his score by choosing a proper tune?

Input

There are multiple test cases. The first line of the input contains an integer T (about 100), indicating the number of test cases. For each test case:

The first line contains one integer n ($1 \le n \le 10^5$), indicating the length of the sequences D and S.

The second line contains n integers $D_1, D_2, \dots, D_n$ ($-10^5 \le D_i \le 10^5$), indicating the song performed by DreamGrid.

The third line contains n integers $S_1, S_2, \dots, S_n$ ($-10^5 \le S_i \le 10^5$), indicating the standard version of the song.

It's guaranteed that at most 5 test cases have $n > 100$.

Output

For each test case output one line containing one integer, indicating the maximum possible score.

Example

<table>
<tr><th>standard input</th><th>standard output</th></tr>
<tr><td><pre>2
4
1 2 3 4
2 3 4 6
5
-5 -4 -3 -2 -1
5 4 3 2 1</pre></td><td><pre>3
1</pre></td></tr>
</table>

Note

For the first sample test case, DreamGrid can choose $K = 1$ and changes D to $\{2, 3, 4, 5\}$.

For the second sample test case, no matter which K DreamGrid chooses, he can only get at most 1 match.

Problem C. Magic 12 Months

It's New Year's Eve, and it's also the best time of the year to play the card game *Magic* 12 *Months* to pray for good luck of the coming year. BaoBao has just found a deck of standard 52 playing cards (without Jokers) in his pocket and decides to play the game. The rules are as follows:

1. **Setup**
   1.1. Remove the four 'K's from the 52 cards.
   1.2. Shuffle the remaining 48 cards and divide them face down into 12 piles (4 cards per pile) with equal probability.
2. **Gameplay**
   2.1. Let $p = 1$.
   2.2. Flip the card on the top of the p-th pile, check its rank r, and discard the card.
   2.3. If r is a number, let $p = r$; If $r =$ 'A', let $p = 1$; If $r =$ 'J', let $p = 11$; If $r =$ 'Q', let $p = 12$.
   2.4. If the p-th pile is empty, the game ends; Otherwise go back to step 2.2.

When the game ends, having all the 4 cards of rank m flipped and discarded indicates that the m-th month in the coming year is a lucky month.

BaoBao is in the middle of the game and has discarded n cards. He wants to know the probability that the i-th month of the coming year is a lucky month for all $1 \le i \le 12$ when the game ends. Given these n cards, please help him calculate the answer.

Input

There are multiple test cases. The first line of input contains an integer T (about 100) – the number of test cases. For each test case:

The first and only line contains an integer n ($0 \le n \le 48$) – the number of flipped cards, followed by the rank of the n cards $r_1, r_2, \dots, r_n$ ($r_i \in \{$A, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q$\}$) separated by a space in the order they are flipped. It's guaranteed that the input describes a valid and possible situation of the game.

Output

For each test case output one line containing 12 numbers separated by a space, where the i-th number indicates the probability that the i-th month of the coming year is a lucky month.

You should output a probability in its simplest fraction form A/B where A and B are coprime. Specifically, if the probability equals 0, you should output 0; If the probability equals 1, you should output 1.

Please, DO NOT output extra spaces at the end of each line, or your answer may be considered incorrect!

Example

standard input
3 30 9 Q 10 J Q 10 J 10 J J 8 5 7 6 5 7 6 7 6 6 3 A 2 4 A 2 4 2 4 4 0 7 2 A 3 A 4 A A
standard output
1 2/3 2/5 1 1/2 1 2/3 2/5 2/5 2/3 1 1/2 1 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1/2 1 0 0 0 0 0 0 0 0 0 0 0

Problem D. Sequence Swapping

BaoBao has just found a strange sequence $\{<s_1, v_1>, <s_2, v_2>, \dots, <s_n, v_n>\}$ of length n in his pocket. As you can see, each element $<s_i, v_i>$ in the sequence is an ordered pair, where the first element s_i in the pair is the left parenthesis '(' or the right parenthesis ')', and the second element v_i in the pair is an integer.

As BaoBao is bored, he decides to play with the sequence. At the beginning, BaoBao's score is set to 0. Each time BaoBao can select an integer k, swap the k-th element and the $(k+1)$-th element in the sequence, and increase his score by $(v_k \times v_{k+1})$, if and only if $1 \le k < n$, $s_k =$ '(' and $s_{k+1} =$ ')'.

BaoBao is allowed to perform the swapping any number of times (including zero times). What's the maximum possible score BaoBao can get?

Input

There are multiple test cases. The first line of the input contains an integer T, indicating the number of test cases. For each test case:

The first line contains an integer n ($1 \le n \le 10^3$), indicating the length of the sequence.

The second line contains a string s ($|s| = n$) consisting of '(' and ')'. The i-th character in the string indicates s_i, of which the meaning is described above.

The third line contains n integers $v_1, v_2, \dots, v_n$ ($-10^3 \le v_i \le 10^3$). Their meanings are described above.

It's guaranteed that the sum of n of all test cases will not exceed 10^4.

Output

For each test case output one line containing one integer, indicating the maximum possible score BaoBao can get.

Example

standard input	standard output
4 6)())() 1 3 5 -1 3 2 6)())() 1 3 5 -100 3 2 3 ()) 1 -1 -1 3 ()) -1 -1 -1	24 21 0 2

Note

For the first sample test case, the optimal strategy is to select $k = 2, 3, 5, 4$ in order.

For the second sample test case, the optimal strategy is to select $k = 2, 5$ in order.

Problem E. LIS

DreamGrid is learning the LIS (Longest Increasing Subsequence) problem and he needs to find the longest increasing subsequence of a given sequence $a_1, a_2, \ldots, a_n$ of length n.

Recall that

- A subsequence $b_1, b_2, \ldots, b_m$ of length m is a sequence satisfying $b_1 = a_{k_1}, b_2 = a_{k_2}, \ldots, b_m = a_{k_m}$ and $1 \le k_1 < k_2 < \cdots < k_m \le n$.
- An increasing subsequence $b_1, b_2, \ldots, b_m$ is a subsequence satisfying $b_1 < b_2 < \cdots < b_m$.

DreamGrid defines the helper sequence $f_1, f_2, \ldots, f_n$ where f_i indicates the maximum length of the increasing subsequence which ends with a_i. In case you don't know how to derive the helper sequence, he provides you with the following pseudo-code which calculates the helper sequence.

```
procedure lis_helper(a: original sequence)
{Let n be the length of the original sequence,
f(i) be the i-th element in sequence f, and a(i)
be the i-th element in sequence a}
for i := 1 to n
  f(i) := 1
  for j := 1 to (i - 1)
    if a(j) < a(i) and f(j) + 1 > f(i)
      f(i) := f(j) + 1
return f {f is the helper sequence}
```

DreamGrid has derived the helper sequence using the program, but the original sequence $a_1, a_2, \ldots, a_n$ is stolen by BaoBao and is lost! All DreamGrid has in hand now is the helper sequence and two range sequences $l_1, l_2, \ldots, l_n$ and $r_1, r_2, \ldots, r_n$ indicating that $l_i \le a_i \le r_i$ for all $1 \le i \le n$.

Please help DreamGrid restore the original sequence which is compatible with the helper sequence and the two range sequences.

Input

There are multiple test cases. The first line of the input contains an integer T, indicating the number of test cases. For each test case:

The first line contains an integer n ($1 \le n \le 10^5$), indicating the length of the original sequence.

The second line contains n integers $f_1, f_2, \ldots, f_n$ ($1 \le f_i \le n$) seperated by a space, indicating the helper sequence.

For the following n lines, the i-th line contains two integers l_i and r_i ($0 \le l_i \le r_i \le 2 \times 10^9$), indicating the range sequences.

It's guaranteed that the original sequence exists, and the sum of n of all test cases will not exceed 5×10^5.

Output

For each test case output one line containing n integers separated by a space, indicating the original sequence. If there are multiple valid answers, print any of them.

Please, DO NOT print extra spaces at the end of each line, or your solution may be considered incorrect!

Example

standard input	standard output
4 6 1 2 3 2 4 3 0 5 2 4 3 3 1 2 3 5 1 5 5 1 2 1 3 1 100 200 200 300 200 400 400 500 100 500 7 1 2 3 1 1 4 2 0 3 0 3 0 3 0 3 0 3 0 3 0 3 2 1 1 1 2 2 3	1 2 3 2 5 3 200 300 200 500 200 0 1 2 0 0 3 1 2 2

Problem F. Now Loading!!!

DreamGrid has n integers $a_1, a_2, \ldots, a_n$. DreamGrid also has m queries, and each time he would like to know the value of

$$\sum_{1 \le i \le n} \left\lfloor \frac{a_i}{\lceil \log_p a_i \rceil} \right\rfloor$$

for a given number p, where $\lfloor x \rfloor = \max\{y \in \mathbb{Z} \mid y \le x\}$, $\lceil x \rceil = \min\{y \in \mathbb{Z} \mid y \ge x\}$.

Input

There are multiple test cases. The first line of input is an integer T indicating the number of test cases. For each test case:

The first line contains two integers n and m ($1 \le n, m \le 5 \times 10^5$) – the number of integers and the number of queries.

The second line contains n integers $a_1, a_2, \ldots, a_n$ ($2 \le a_i \le 10^9$).

The third line contains m integers $p_1, p_2, \ldots, p_m$ ($2 \le p_i \le 10^9$).

It is guaranteed that neither the sum of all n nor the sum of all m exceeds 2×10^6.

Output

For each test case, output an integer $(\sum_{i=1}^{m} i \cdot z_i) \bmod 10^9$, where z_i is the answer for the i-th query.

Example

standard input	standard output
2 3 2 100 1000 10000 100 10 4 5 2323 223 12312 3 1232 324 2 3 5	11366 45619

Problem G. JUMPin' JUMP UP!!!

Tired of solving mathematical equations, DreamGrid starts to solve equations related to strings: for two strings x and y with the same length consisting of lowercase English letters, calculate $f(x, y, n)$, which is defined as the number of nonempty strings z consisting of lowercase English letters such that $xz = zy$ and the length of z does not exceed n.

DreamGrid has two strings $s = s_1s_2 \dots s_n$ and $t = t_1t_2 \dots t_m$. He would like to ask several questions about the value of $f(t, s[x..(x + m - 1)], y)$, where $s[x..(x + m - 1)]$ is the substring of s starting from s_x with length m and y is a given number.

Input

There are multiple test cases. The first line of input contains an integer T, indicating the number of test cases. For each test case:

The first line contains three integers n and m and q ($1 \le n, m, q \le 10^5, m \le n$) – the length of s, the length of t and the number of questions.

The second line contains n lowercase English letters denoting the string s. The third line contains m lowercase English letters denoting the string t.

Each of the next q lines contains two integers x_i and y_i ($1 \le x_i \le n + 1 - m, 1 \le y_i \le 10^{18}$) denoting the i-th question.

It is guaranteed that neither the sum of all n nor the sum of all q exceeds 10^6.

Output

For each question, output an integer denoting the answer.

Example

standard input	standard output
1 4 2 3 abcd ba 1 2 2 2 3 2	1 0 0

Problem H. Game on a Tree

BaoBao is playing a game on a rooted tree with n vertices and $(n-1)$ weighted edges. At the beginning of the game, a chess piece is placed on the root of the tree, which is vertex 1.

In each step, BaoBao can perform one of the four operations:

1. Move the chess piece along an edge from its current vertex to a child vertex. This operation will cost BaoBao w units of value, where w is the weight of the edge.
2. Jump the chess piece back to vertex 1. This operation is free and won't cost BaoBao any unit of value.
3. Set a "save point" on the current vertex of the chess piece. If a save point has been set on some other vertex before, the save point on the old vertex will be removed (so there will be at most one save point on the tree at the same time). This operation is free and won't cost BaoBao any unit of value.
4. Jump the chess piece back to the save point (the save point must be set before this operation). This operation is free and won't cost BaoBao any unit of value.

The goal of the game is to visit every leaf vertex of the tree using the chess piece. Please help BaoBao calculate the minimum units of value he has to spend to achieve the goal.

Recall that a leaf vertex of a tree is a vertex with no child.

Input

There are multiple test cases. The first line of the input contains an integer T, indicating the number of test cases. For each test case:

The first line contains one integer n ($2 \le n \le 200$), indicating the size of the tree.

The following $(n-1)$ lines each contains three integers u_i, v_i and w_i ($1 \le u_i, v_i \le n$, $1 \le w_i \le 10^9$), indicating an edge connecting vertex u_i and vertex v_i with weight w_i in the tree.

It's guaranteed that the given graph is a tree, and the sum of n over all test cases will not exceed 2000.

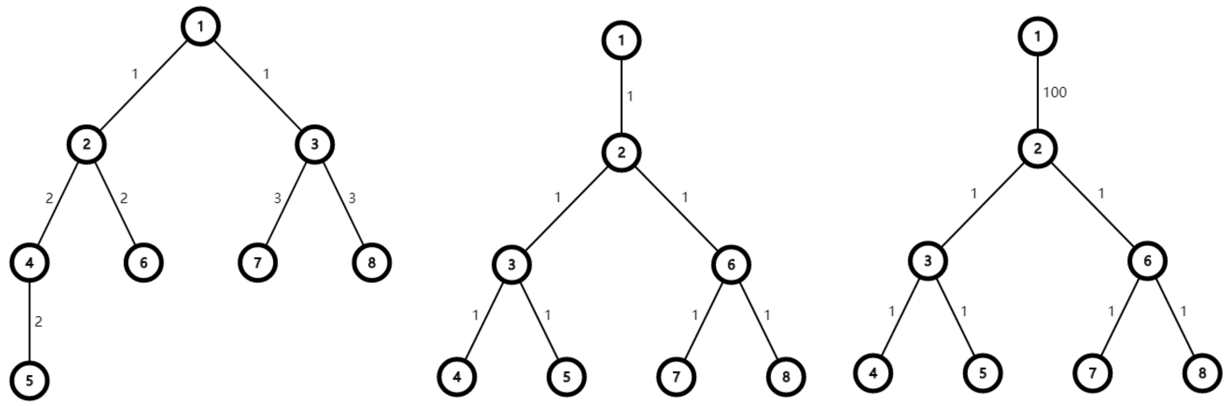
Output

For each test case output one line containing one integer, indicating the minimum units of value BaoBao has to spend to achieve the goal.

Example

standard input	standard output
3	14
8	8
1 2 1	107
3 1 1	
2 4 2	
5 4 2	
6 2 2	
3 7 3	
8 3 3	
8	
1 2 1	
2 3 1	
3 4 1	
3 5 1	
2 6 1	
6 7 1	
6 8 1	
8	
1 2 100	
2 3 1	
3 4 1	
3 5 1	
2 6 1	
6 7 1	
6 8 1	

Note



The trees of the sample test cases are shown above.

For the first sample test case, BaoBao should perform the following operations: go to 2, save on 2, go to 4, go to 5, back to save (2), go to 6, back to root (1), go to 3, save on 3, go to 7, back to save (3), go to 8.

For the second sample test case, BaoBao should perform the following operations: go to 2, go to 3, save on 3, go to 4, back to save (3), go to 5, back to root (1), go to 2, go to 6, save on 6, go to 7, back to save (7), go to 8.

For the third sample test case, BaoBao should perform the following operations: go to 2, save on 2, go to 3, go to 4, back to save (2), go to 3, go to 5, back to save (2), go to 6, save on 6, go to 7, back to save (6), go to 8.

Problem I. Magic Points

Given an integer n, we say a point (x, y) on a 2D plane is a magic point, if and only if both x and y are integers, and exactly one of the following conditions is satisfied:

- $0 \le x < n$ and $y = 0$;
- $0 \le x < n$ and $y = n - 1$;
- $x = 0$ and $0 \le y < n$;
- $x = n - 1$ and $0 \le y < n$.

It's easy to discover that there are $(4n - 4)$ magic points in total. These magic points are numbered from 0 to $(4n - 5)$ in counter-clockwise order starting from $(0, 0)$.

DreamGrid can create n magic lines from these magic points. Each magic line passes through exactly two magic points but cannot be parallel to the line $x = 0$ or $y = 0$ (that is to say, the coordinate axes).

The intersections of the magic lines are called dream points, and for some reason, DreamGrid would like to make as many dream points as possible. Can you tell him how to create these magic lines?

Input

There are multiple test cases. The first line of input contains an integer T (about 100), indicating the number of test cases. For each test case, there is only one integer n ($2 \le n \le 1000$).

Output

For each case output $2n$ integers $p_1, p_2, \ldots, p_{2n}$ in one line separated by one space, indicating that in your answer, point p_{2k-1} and point p_{2k} is connected by a line for all $1 \le k \le n$.

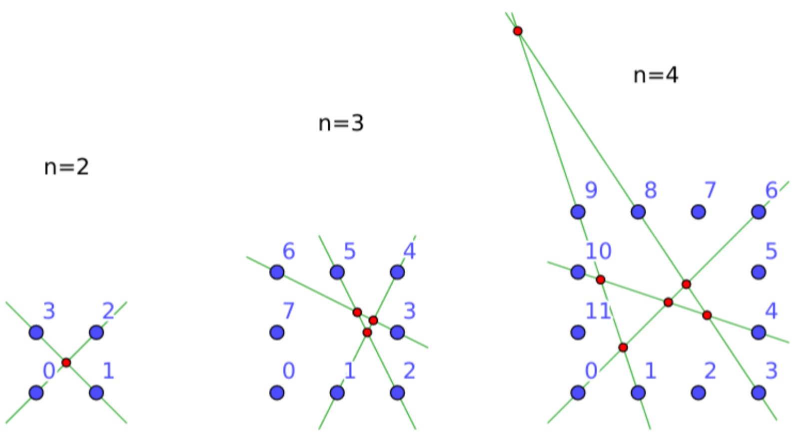
If there are multiple answers, you can print any of them.

Example

standard input	standard output
3	0 2 1 3
2	1 4 2 5 3 6
3	0 6 1 9 3 8 4 10
4	

Note

The sample test cases are shown as follow:



Problem J. CONTINUE...?

DreamGrid has n classmates numbered from 1 to n. Some of them are boys and the others are girls. Each classmate has some gems, and more specifically, the i-th classmate has i gems.

DreamGrid would like to divide the classmates into four groups G_1, G_2, G_3 and G_4 such that:

- Each classmate belongs to exactly one group.
- Both G_1 and G_2 consist only of girls. Both G_3 and G_4 consist only of boys.
- The total number of gems in G_1 and G_3 is equal to the total number of gems in G_2 and G_4.

Your task is to help DreamGrid group his classmates so that the above conditions are satisfied. Note that you are allowed to leave some groups empty.

Input

There are multiple test cases. The first line of input is an integer T indicating the number of test cases. For each test case:

The first line contains an integer n ($1 \le n \le 10^5$) – the number of classmates.

The second line contains a string s ($|s| = n$) consisting of 0 and 1. Let s_i be the i-th character in the string s. If $s_i = 1$, the i-th classmate is a boy; If $s_i = 0$, the i-th classmate is a girl.

It is guaranteed that the sum of all n does not exceed 10^6.

Output

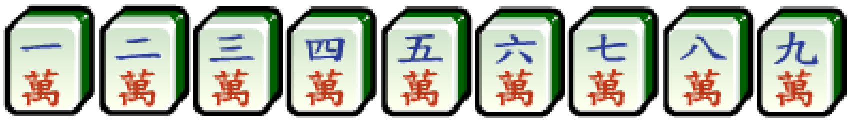
For each test case, output a string consists only of {1, 2, 3, 4}. The i-th character in the string denotes the group which the i-th classmate belongs to. If there are multiple valid answers, you can print any of them; If there is no valid answer, output "-1" (without quotes) instead.

Example

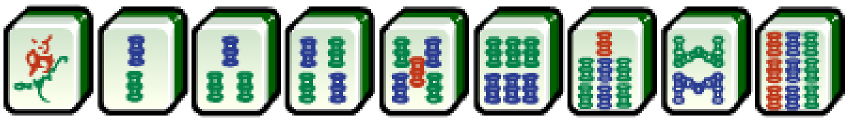
standard input	standard output
5 1 1 2 10 3 101 4 0000 7 1101001	-1 -1 314 1221 3413214

Problem K. Mahjong Sorting

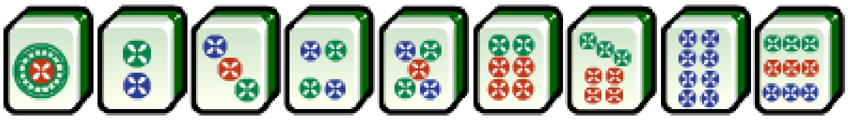
DreamGrid has just found a set of Mahjong with $3M$ suited tiles and a White Dragon tile in his pocket. Each suited tile has a suit (Character, Bamboo or Dot) and a rank (ranging from 1 to M), and there is exactly one tile of each rank and suit combination.



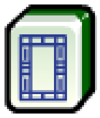
Character tiles whose rank ranges from 1 to 9



Bamboo tiles whose rank ranges from 1 to 9



Dot tiles whose rank ranges from 1 to 9



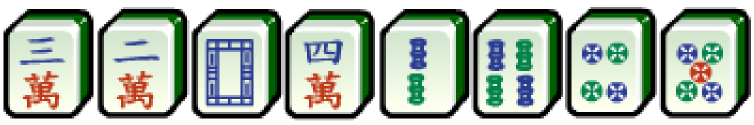
White Dragon tile

As DreamGrid is bored, he decides to play with these tiles. He first selects one of the $3M$ **suited** tiles as the "lucky tile", then he picks N tiles from the set of $(3M + 1)$ tiles and sorts these N tiles with the following rules:

- The "lucky tile", if contained in the N tiles, must be placed in the leftmost position.
- For two tiles A and B such that neither of them is the "lucky tile", if
  - A is a Character tile and B is a Bamboo tile, or
  - A is a Character tile and B is a Dot tile, or
  - A is a Bamboo tile and B is a Dot tile, or
  - A and B have the same suit and the rank of A is smaller than the rank of B,

  then A must be placed to the left of B.

White Dragon tile is a special tile. If it's contained in the N tiles, it's considered as the original (not-lucky) version of the lucky tile during the sorting. For example, consider the following sorted tiles, where "3 Character" is selected as the lucky tile. White Dragon tile, in this case, is considered to be the original not-lucky version of "3 Character" and should be placed between "2 Character" and "4 Character".



As DreamGrid is quite forgetful, he immediately forgets what the lucky tile is after the sorting! Given N sorted tiles, please tell DreamGrid the number of possible lucky tiles.

Input

There are multiple test cases. The first line of the input contains an integer T, indicating the number of test cases. For each test case:

The first line contains two integers N and M ($1 \le N, M \le 10^5$, $N \le 3M + 1$), indicating the number of sorted tiles and the maximum rank of suited tiles.

For the next N lines, the i-th line describes the i-th sorted tile counting from left to right. The line begins with a capital letter s_i ($s_i \in \{C, B, D, W\}$), indicating the suit of the i-th tile:

- If $s_i = C$, then an integer r_i ($1 \le r_i \le M$) follows, indicating that it's a Character tile with rank r_i;
- If $s_i = B$, then an integer r_i ($1 \le r_i \le M$) follows, indicating that it's a Bamboo tile with rank r_i;
- If $s_i = D$, then an integer r_i ($1 \le r_i \le M$) follows, indicating that it's a Dot tile with rank r_i;
- If $s_i = W$, then it's a White Drangon tile.

It's guaranteed that there exists at least one possible lucky tile, and the sum of N in all test cases doesn't exceed 10^6.

Output

For each test case output one line containing one integer, indicating the number of possible lucky tiles.

Example

standard input	standard output
4 3 9 C 2 W C 4 6 9 C 2 C 7 W B 3 B 4 D 2 3 100 C 2 W C 9 3 9 C 1 B 2 D 3	2 4 7 25

Note

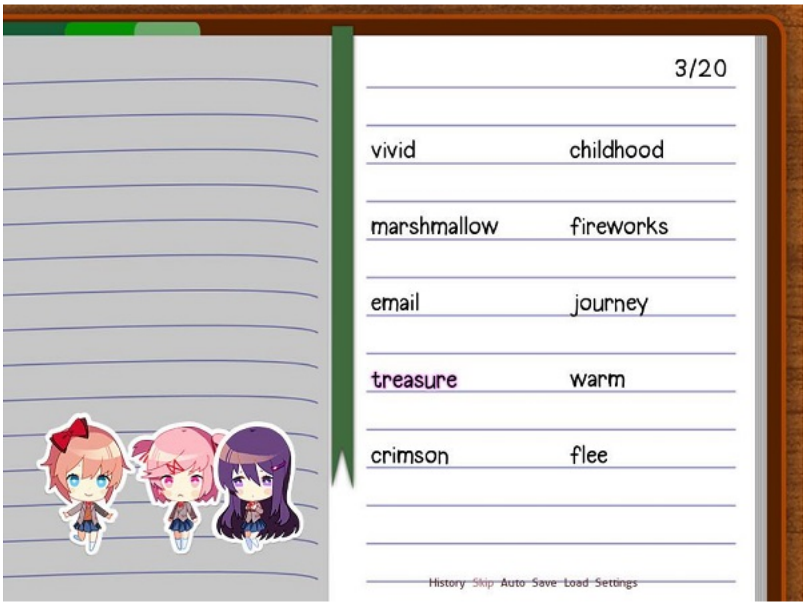
For the first sample, "2 Character" and "3 Character" are possible lucky tiles.

For the second sample, "8 Character", "9 Character", "1 Bamboo" and "2 Bamboo" are possible lucky tiles.

Problem L. Doki Doki Literature Club

Doki Doki Literature Club! is a visual novel developed by Team Salvato. The protagonist is invited by his childhood friend, Sayori, to join their high school's literature club. The protagonist then meets the other members of the club: Natsuki, Yuri, and the club president Monika. The protagonist starts to participate in the club's activities such as writing and sharing poetry, and grows close to the four girls. What a lovely story!

A very important feature of the game is its poetry writing mechanism. The player is given a list of various words to select from that will make up his poem. Each girl in the Literature Club has different word preferences, and will be very happy if the player's poem is full of her favorite words.



The poem writing mini-game (from wikipedia)

BaoBao is a big fan of the game and likes Sayori the most, so he decides to write a poem to please Sayori. A poem of m words $s_1, s_2, \ldots, s_m$ is nothing more than a sequence of m strings, and the happiness of Sayori after reading the poem is calculated by the formula

$$H = \sum_{i=1}^{m} (m - i + 1) \cdot f(s_i)$$

where H is the happiness and $f(s_i)$ is Sayori's preference to the word s_i.

Given a list of n words and Sayori's preference to each word, please help BaoBao select m words from the list and finish the poem with these m words to maximize the happiness of Sayori.

Please note that each word can be used at most **once**!

Input

There are multiple test cases. The first line of input contains an integer T (about 100), indicating the number of test cases. For each test case:

The first line contains two integers n and m ($1 \le m \le n \le 100$), indicating the number of words and the length of the poem.

For the following n lines, the i-th line contains a string consisting of lowercased English letters w_i ($1 \le |w_i| \le 15$) and an integer $f(w_i)$ ($-10^9 \le f(w_i) \le 10^9$), indicating the i-th word and Sayori's preference to this word. It's guaranteed that $w_i \neq w_j$ for all $i \neq j$.

Output

For each test case output one line containing an integer H and m strings $s_1, s_2, \ldots, s_m$ separated by one space, indicating the maximum possible happiness and the corresponding poem. If there are multiple poems which can achieve the maximum happiness, print the lexicographically smallest one.

Please, DO NOT output extra spaces at the end of each line, or your answer may be considered incorrect!

A **sequence** of m strings $a_1, a_2, \ldots, a_m$ is lexicographically smaller than another **sequence** of m strings $b_1, b_2, \ldots, b_m$, if there exists a k ($1 \le k \le m$) such that $a_i = b_i$ for all $1 \le i < k$ and a_k is lexicographically smaller than b_k.

A **string** $s_1 = a_1a_2 \ldots a_x$ is lexicographically smaller than another **string** $s_2 = b_1b_2 \ldots b_y$, if there exists a k ($1 \le k \le \min(x, y)$) such that $a_i = b_i$ for all $1 \le i < k$ and $a_k < b_k$, or $a_i = b_i$ for all $1 \le i \le \min(x, y)$ and $x < y$.

Example

<table>
<tr><th>standard input</th><th>standard output</th></tr>
<tr><td><pre>4
10 8
hello 0
world 0
behind 0
far 1
be 2
spring 10
can 15
comes 20
winter 25
if 200
5 5
collegiate 0
programming -5
zhejiang 10
provincial 5
contest -45
3 2
bcda 1
bcd 1
bbbbb 1
3 2
a 1
aa 1
aaa 1</pre></td><td><pre>2018 if winter comes can spring be far behind
15 zhejiang provincial collegiate programming contest
3 bbbbb bcd
3 a aa</pre></td></tr>
</table>

Problem M. Lucky 7

BaoBao has just found a positive integer sequence $a_1, a_2, \ldots, a_n$ of length n from his left pocket and another positive integer b from his right pocket. As number 7 is BaoBao's favorite number, he considers a positive integer x lucky if x is divisible by 7. He now wants to select an integer a_k from the sequence such that $(a_k + b)$ is lucky. Please tell him if it is possible.

Input

There are multiple test cases. The first line of the input is an integer T (about 100), indicating the number of test cases. For each test case:

The first line contains two integers n and b ($1 \le n, b \le 100$), indicating the length of the sequence and the positive integer in BaoBao's right pocket.

The second line contains n positive integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 100$), indicating the sequence.

Output

For each test case output one line. If there exists an integer a_k such that $a_k \in \{a_1, a_2, \ldots, a_n\}$ and $(a_k + b)$ is lucky, output "Yes" (without quotes), otherwise output "No" (without quotes).

Example

standard input	standard output
4 3 7 4 5 6 3 7 4 7 6 5 2 2 5 2 5 2 4 26 100 1 2 4	No Yes Yes Yes

Note

For the first sample test case, as $4 + 7 = 11$, $5 + 7 = 12$ and $6 + 7 = 13$ are all not divisible by 7, the answer is "No".

For the second sample test case, BaoBao can select a 7 from the sequence to get $7 + 7 = 14$. As 14 is divisible by 7, the answer is "Yes".

For the third sample test case, BaoBao can select a 5 from the sequence to get $5 + 2 = 7$. As 7 is divisible by 7, the answer is "Yes".

For the fourth sample test case, BaoBao can select a 100 from the sequence to get $100 + 26 = 126$. As 126 is divisible by 7, the answer is "Yes".