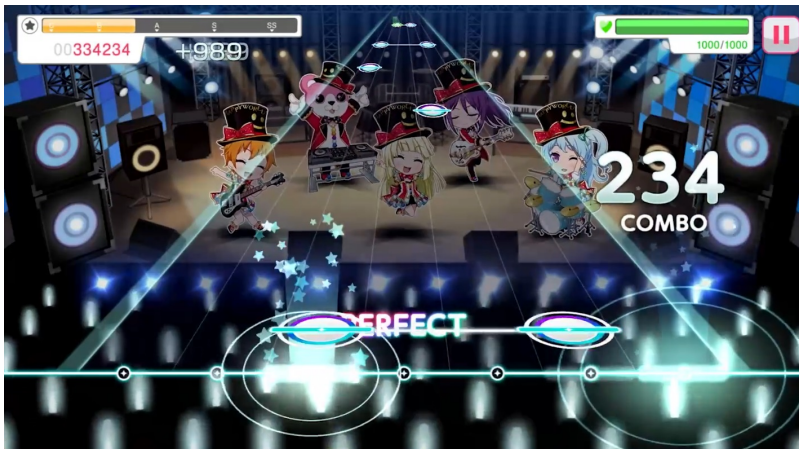
Problem A. MUG

Music Game(MUG) is a kind of game in which players press the key with the rhythm of the music, in order to gain the score as much as possible. If players press a key too early or too late, he could only gain part of the score or nothing at all.

BangDream is one of the popular music games on the mobile terminal. In the game, keys fall down in order on seven different tracks and every key has a different score of points S_i. For convenience, all points could be divided by 100.



LCD is a novice of MUG and he could only use his left hand or right hand to press the key in one time. As a result, he always chooses the easy version of the song. That is, there is no double-press(pressing two keys at the same time) in this version and the intervals of the keys are even. So LCD could use his left hand and right hand in turn to get "ALL PERFECT" in the game and gain a full score of every key.

But it is not always lucky, because he has to cross his hands on some occasions, and this kind of action will reduce his accuracy. For example, we mark the tracks from 1 to 7 from left to right, and there are three keys falling on track 2 and 4 one by one. If LCD presses the key on track 2 with his right hand and the key on track 4 with his left hand, then this action is called "a crossing ", and the accuracy of pressing the key on track 4 will be reduced. This doesn't affect the accuracy of pressing the key on track 2, unless there is another crossing before. In a special case, if LCD uses two hands, in turn, to press two keys on the same track, it is not considered as a crossing.

If he crosses his left hand to the right, his accuracy would reduce to P_1, and only gain $P_1\%$ points of the key. And if he crosses his right hand to left, he could only gain $P_2\%$ points.

However, he found that he could use a single hand continuously and free his left hand to reduce the times of crossing. During this action, his left hand is free, so it will not be considered as a crossing. He also found it too hard to use his left hand continuously and he will lose the rhythm of the music if he does so.

If he uses his right hand continuously, his accuracy would reduce to P_3 and only gain $P_3\%$ points (the first use of the right hand will not affect the accuracy). Using the left hand continuously is not allowed.

He can also give up a key to take a short break. After that, he can choose his hand freely without the reduction of accuracy.

LCD has a brilliant brain so that he could remember the order and position of every key, and all he needs to do is to calculate the highest score.

Input

The input contains one case. The first line of the input contains a single positive integer $N(2 \leq N \leq 10^6)$, the number of keys.

Then next line contains N integers $S_i(0 < S_i \leq 10^7)$, the score of each key in order. It is guaranteed that all S_i can be divided by 100.

Then the third line contains N integers $t_i(1 \le t_i \le 7)$, the track of each key falling on in order (marked from left to right).

Then the last line contains three integers $P_1(0 \le P_1 \le 100)$, $P_2(0 \le P_2 \le 100)$, and $P_3(0 \le P_3 \le 100)$, the accuracy of LCD when he cross his hands or use a single hand continuously.

Output

For each case, print a single integer Pt on the first line, the highest score LCD could get.

Examples

standard input	standard output
2 500 1000 7 2 36 10 90	1500
6 1000 1000 100000 100 100000 1000 2 3 2 1 2 1 1 1 1	203000

Note

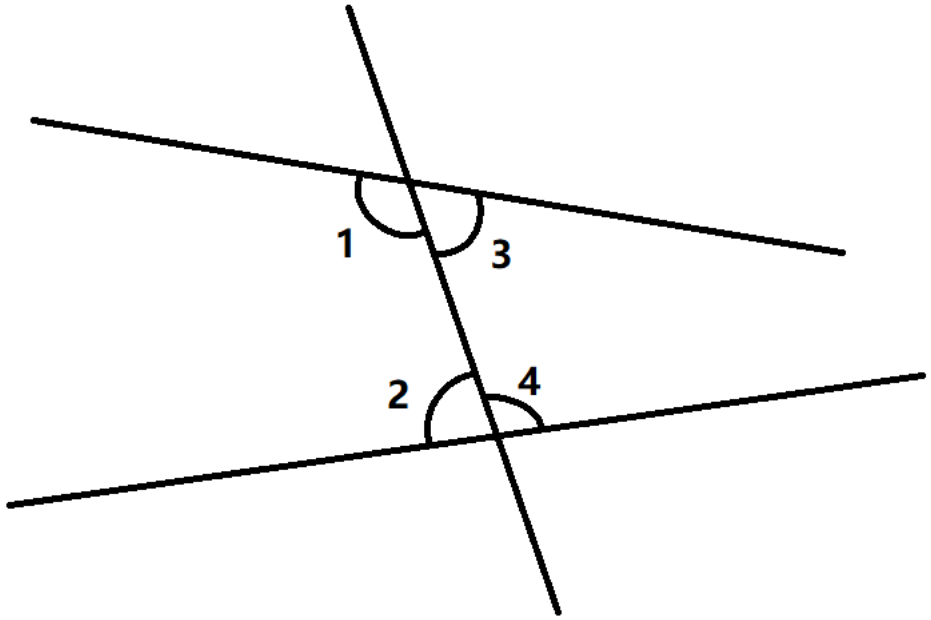
As for sample 1, press the first key with the right hand and press the next key with the left hand.

As for sample 2, give up the fourth key. press the key with hands in left, right, left, (none), right, and left order.

Problem B. Count Angles

QAQza has got interested in **consecutive interior angles** recently.

Consecutive interior angles can be defined as follows: When two lines are crossed be another line (called the Transversal), the pair of angles on one side of the transversal but inside the two lines is called a pair of consecutive interior angles. There is an example:



$\angle 1$ and $\angle 2$, $\angle 3$ and $\angle 4$ are two pairs of consecutive interior angles.

QAQza wants to know the **maximal** number of pairs of consecutive interior angles formed by arbitrary n lines in the same plane. Since he is too vegetable(adj.), he asks you for help.

Input

The first line contains a single integer T ($1 \leqslant T \leqslant 10^5$) —the number of queries.

Next T lines contain integers to describe queries—one integer n ($1 \leqslant n \leqslant 10^9$) per line.

Output

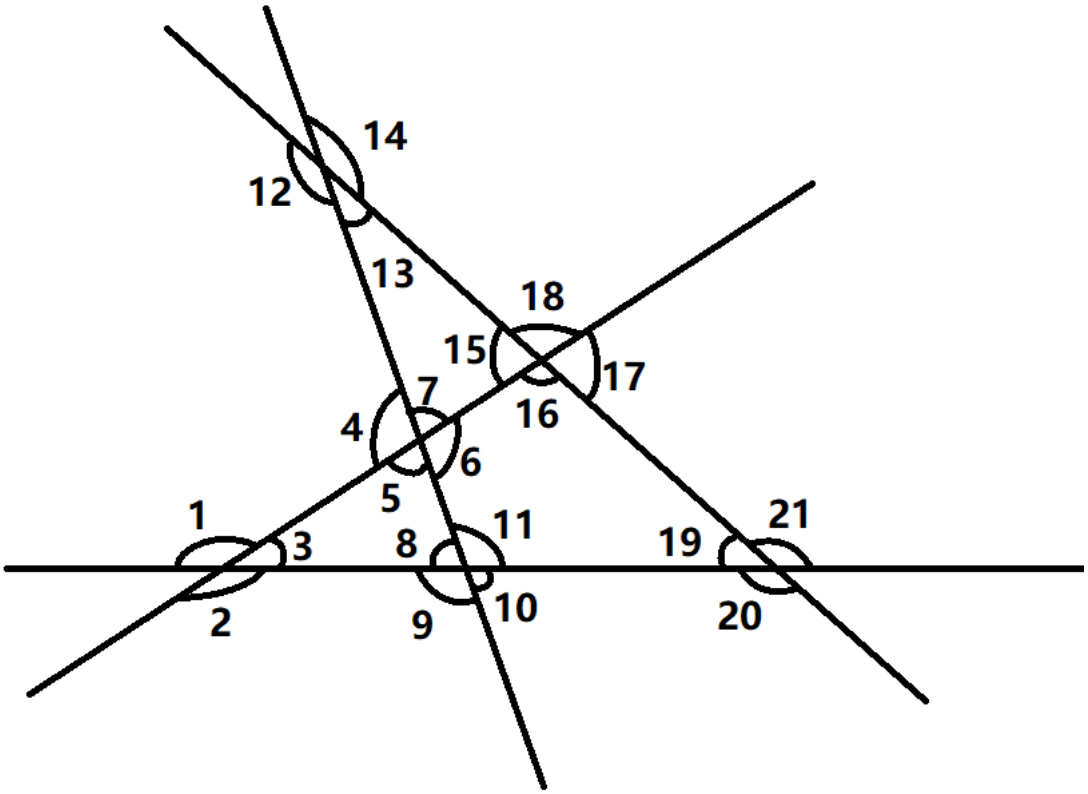
Print T integers—one per query, which is the maximal number of pairs for this query. Since the answer may be too large, you should only print the remainder of the answer divided by $10^9 + 7$.

Example

standard input	standard output
1 4	24

Note

the 24 pairs of consecutive interior angles are as follows:



$(\angle 1, \angle 4), (\angle 1, \angle 15), (\angle 2, \angle 9), (\angle 2, \angle 20), (\angle 3, \angle 5),$
$(\angle 3, \angle 8), (\angle 3, \angle 16), (\angle 3, \angle 19), (\angle 4, \angle 12), (\angle 5, \angle 8),$
$(\angle 6, \angle 11), (\angle 6, \angle 16), (\angle 7, \angle 13), (\angle 7, \angle 15), (\angle 8, \angle 12),$
$(\angle 10, \angle 20), (\angle 11, \angle 13), (\angle 11, \angle 19), (\angle 13, \angle 15), (\angle 13, \angle 19),$
$(\angle 14, \angle 18), (\angle 14, \angle 21), (\angle 16, \angle 19), (\angle 17, \angle 21).$

There are no more than 24 pairs, so the answer is 24.

Problem C. Almost Neighbour Queries

In an unweighted undirected graph, we can define the distance of two nodes as the least number of edges in a path connecting them. If two nodes are disconnected, then the distance is positive infinity.

The graph has no edge at the beginning.

You need to do the following two operations:

1. add an edge between two nodes u and v.

2. answer if the distance between two nodes u and v is exactly 2. ("Yes" or "No")

Input

The first line contains two space-separated integers $n, m (2 \leq n \leq 114514, 1 \leq m \leq 114514)$ denoting the number of nodes in the graph and the number of operations.

In the following m lines, each line contains three space-separated integers $op, u, v (1 \leq op \leq 2, 1 \leq u, v \leq n, u \neq v)$, representing an operation.

Output

Output several lines, each gives the answer to an operation 2.

Example

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

Problem D. Words

"Why do my words always lose their meanings?"

River has a lot to say to John, but since she has autism, she doesn't know how to express it. To be specific, River will have a sentence to say to John every day in the next n days. Every day River says a sentence of length l, because she isn't sure what she's going to say, so we assume that the l characters in each sentence are uniformly randomly generated in a set of c characters.

River decided to use a Trie to express her sentence, everyday she inserts her sentence into the Trie. River wants to know how much work it takes to do so, so she asked you to answer the expectation of the number of the nodes of the Trie (without root) after everyday she inserts her sentence.

Since River likes 998244353 very much, she hopes that you can output the answer modulo 998244353.

Input

One line contains three integers $n, l, c (1 \le n \le 10^5, 1 \le l, c \le 10^9)$.

Output

Output n lines, each line contains one integer - the ith line shows the number of nodes after inserting i sentences.

Examples

standard input	standard output
2 2 2	2 748683268
5 4 3	4 911976330 792083550 276733174 815453946

Note

Trie is a tree that the preorder traversal of it is the list of strings sorted by dictionary. Each route from root to the leaf represents a string.

Problem E. Grammy's Restaurant

Grammy is running a small restaurant. He has m cooks. Every day he can only command one of them to come to work. In n days, every day Grammy plans to prepare k_i dishes. Each dish has a taste value a_i. Each cook has a capacity interval $[l_i, r_i]$ which means he can only cook dishes whose taste value is in interval $[l_i, r_i]$.

For each day, suppose the cook's capacity interval for this day is $[l_j, r_j]$,Grammy's happy degree $happy_i$ equals to $r_j - l_j + \sum k * a_i$ where a_i is the taste value of $dish_i$ that he can cook and k means a_i is the kth smallest value in all dishes he will cook.

For example, if the interval is $[5, 7]$ and the taste values are 1,2,3,4,5,6,7, then Grammy's happy degree $happy_i = 7 - 5 + 1 * 5 + 2 * 6 + 3 * 7 = 40$.
If the interval is $[2, 3]$ and the taste values are 2,2, then Grammy's happy degree $happy_i = 3 - 2 + 1 * 2 + 2 * 2 = 7$

For each day, Grammy wish you to tell him the maximal happy value he can get if he chooses cook optimally according to the dishes.

Input

The first line contains two positive integers n and m ($n <= 1e5, m <= 1e5$), the number of days and the number of cooks.
The second line contains 2m integers $l_1, r_1, l_2, r_2, ..., l_m, r_m (1 <= l_i <= r_i <= 1e9)$, depicting the capacity interval of m cooks.
The following n lines illustrate the dishes of n days. Each line has an integer k_i first, then comes k_i integers $a_1, a_2, ..., a_{k_i} (1 <= a_i <= 1e9)$ which depict the taste values of k_i dishes of this day. ($\sum k_i <= 1e5$)

Output

For each day, output a single integer representing the maximal happy value Grammy can get for this day.

Example

standard input	standard output
5 5 1 6 4 7 7 8 9 9 11 14 1 9 10 1 2 3 4 5 6 7 8 9 10 4 21 22 23 10 5 5 6 7 8 9 3 4 6 8	9 96 5 41 21

Problem F. Balloons Tower Defence

Dart monkey is practicing popping balloons. He has a strong catapult which can shoot out spiked balls to pop a line of balloons.

Ice monkey used his "Snowstorm" ability to freeze n balloons on track, letting dart monkey to shoot safely.

Now, every balloon became immobilized and their coordinates were measured by monkey submarine. Dart monkey wondered whether it is possible use a single spiked ball to pop at least $p\%$ of the balloons, so he asked for your help.

The diameter of the balloons and the spiked ball are negligible.

Input

The first line contains a positive integer n ($1 \leq n \leq 100000$).

The second line contains a positive integer p ($20 \leq p \leq 100$).

In each of the following n lines contains x and y coordinates of a balloon, separated by space. ($0 \leq x, y \leq 10^9$)

Output

One line, either "possible" or "impossible". (without quotes)

Examples

standard input	standard output
5 60 1 1 2 2 3 3 0 4 5 7	possible
5 61 1 1 2 2 3 3 0 4 5 7	impossible