JnU Intra University Programming Contest 2023

https://toph.co/contests/training/2cbypdx

Toph

Schedule

The contest will run for **3h0m0s**.

The standings will be frozen for the last **45m0s** of the contest.

Authors

The authors of this contest are ash_98, Neaj_Morshad, and salim_jnu.

Rules

This contest is formatted as per the official rules of ICPC Regional Programming Contests.

You can use Bash 5.0, Brainf*ck, C# Mono 6.0, C++11 GCC 7.4, C++14 GCC 8.3, C++17 GCC 9.2, C++20 GCC 12.1, C11 GCC 12.1, C11 GCC 9.2, Common Lisp SBCL 2.0, Erlang 22.3, Free Pascal 3.0, Go 1.18, Grep 3.7, Haskell 8.6, Java 1.8, Kotlin 1.1, Lua 5.4, Node.js 10.16, Perl 5.30, PHP 7.2, PyPy 7.1 (2.7), PyPy 7.1 (3.6), Python 2.7, Python 3.7, Ruby 2.6, Rust 1.57, Swift 5.3, and Whitespace in this contest.

Be fair, be honest. Plagiarism will result in disqualification. Judges' decisions will be final.

Notes

There are 9 challenges in this contest.

Please make sure this booklet contains all of the pages.

If you find any discrepencies between the printed copy and the problem statements in Toph Arena, please rely on the later.

Disclaimer

The contents of this contest have not been reviewed by Toph and do not necessarily represent Toph's views.

A. Prize Money and Snacks

As you are participating in JnU Intra University Programming Contest, Your friends are always asking you saying “Tui Prize Money Koto Pabi Re?” And you have said that it depends on the rank you will achieve in the contest. But they are not satisfied.

They are asking you telling a rank like “If you got a rank X, then what will you get?

As per the announcement, the prize will be distributed as follows:

1st Prize: 3000/=

2nd Prize: 2000/=

3rd Prize: 1500/=

4th and 5th: 1000/=

6th to 10th: 500/=

And all participants will get snacks.

Now, you are obsessed with answering your friend’s questions.

As a programmer, you decided to write a program that will take a rank X as input and print what you will get if your rank is X.

Input

First Line consists of an integer T ($1 \leq T \leq 1000$), the number of test cases.

Each test case starts with an integer X ($1 \leq X \leq 1000$), The rank your friend asked for.

Output

For each test case, output the prize money you will get if your rank is X.

If you don’t get any prize with the rank X. Then output “Only Snacks” without quotes.

Please don’t print anything like “3000 and Snacks”, If there is no prize for the input rank X, then you should print “Only Snacks” only without quotes.

Samples

Input	Output
3 1 9 500	3000 500 Only Snacks

Solve this problem and prove that you are better than “Neaj_Morshad_101”

B. Recall School Math

This is ash_98 here to test your high school math skills.

According to Wikipedia,

An **arithmetic progression** or **arithmetic sequence** (AP) is a sequence of numbers such that the difference from any succeeding term to its preceding term remains constant throughout the sequence. The constant difference is called the common difference of that arithmetic progression. For instance, the sequence 5, 7, 9, 11, 13, 15, $\cdots$ is an arithmetic progression with a common difference of 2.

If the initial term of an arithmetic progression is a and the common difference of successive members is d, then the n-th term of the sequence is given by $t_n = a + (n-1) * d$ and the sum of first n term is $S_n = \frac{n}{2}(2 * a + (n-1) * d)$.

You are given n and t_n, you have to print S_{2n-1}.

Input

Each test contains multiple test cases. The first line contains a single integer $t(1 \leq t \leq 10^5)$— the number of test cases. A description of the test cases follows.

The first line of each test case contains two integers n and $a_n(1 \leq n \leq 10^9; -10^9 \leq t_n \leq 10^9)$—the term and terms value.

Output

For each test case, output an integer the value of S_{2n-1}

Samples

Input	Output
1 1 1	1

Input	Output
1 4 32	224

Output may not fit in 32-bit integer.

C. Divisors of Sum

Nasir sir likes $prime$ number p. Uzzal sir chooses another number q**,** where $q > 1$. Now Zulfiker Sir randomly choose four students and asked them to say one number each. They said four integers a, b, c and d respectively, c is a $prime$.

Let , $x = a^b, y = c^d, val_1 = x * p, val_2 = q * a * y, Sum = val_1 + val_2$.

After a lot of calculations, they asked you to find two numbers n and m**,** such that the Sum is equal to the product of n and m.But Zulfiker sir says that it is very easy. Sir add a condition **n must be greater than 1 and as small as possible.**

Can you find the value of **n** and **m**?

Input

The first line contains an integer $T(1 \leq T \leq 100)-$ the number of test cases.

In each of the test cases, the first line will contain two integers $p(3 \leq p < 59)$ and $q(1 < q \leq 10^4)-$ the chosen number of Nasir Sir and Uzzal Sir respectively.

The next line contains four integers $a(10^7 \leq a \leq 10^9)$**,** $b(0 < b \leq 2)$**,** $c(59 \leq c \leq 127)$**,** and $d(0 \leq d \leq 2)-$ the chosen number of the first, second, third, and fourth students respectively.

It is guaranteed that p and c are **prime** numbers and $1 < Sum \leq 10^{18}$.

Output

In each test case, print the value of n and m where $(1 < n \leq m)$ and $n * m = Sum$.

It is guaranteed answer always exists.

Samples

Input	Output
1 3 2 10000001 1 59 2	5 13930001393
Here, $x = 10000001^1 = 10000001$ and $y = 59^2 = 3481$ $val_1 = x * p = 30000003$ and	

Input	Output
Finally $sum = (30000003 + 69620006962) = 69650006965$ if we select n = 5 and m = 13930001393, so $n * m = 5 * 13930001393 = 69650006965$ where $1 < n <= m$	

D. ash_98 and his son

One day ash_98 is sleeping and dreams that he and his son are playing a game. At the beginning of the game, they have a number N. In a single move of this game choose a value d such that N is divisible by d and $2 \leq d \leq N-1$, set $N = N/d$. When one is unable to make a move he loses the game. Both of them give moves alternatively. He moves first then his son and so on.

After a while, he wakes up and thinks about the dream. The question is he is unmarried, how did the boy come? But he wants to give you this problem and you have to print the name of the winner of this game if he and his son play the game optimally.

Input

Each test contains multiple test cases. The first line contains a single integer $t (1 \leq t \leq 10^4) -$ the number of test cases. Description of the test cases follows.

The first line of each test case contains a single integer $N (1 \leq N \leq 10^9) -$ initial number of the game.

Output

For each test case, print a string “ash_98” if ash_98 wins the game otherwise “son”.

Samples

Input	Output
2 2 4	son ash_98

E. Neaj's Job Interview Preparation

Neaj Morshad needs to collect slides on different subjects in preparation for his upcoming job interview and as he never really cared about his academics he doesn't have slides in his collection. So he needs to collect these slides from his friend.

In a Software Engineering job interview questions are asked mainly on the subject of DSA(Data Structure and Algorithm), OOP(Object Oriented Programming), DBMS(Database Management System), and CN(Computer Networks).

He has N friends who have these slides. But he does not know (as he never cared) which friends have slides on which topics.

As he is busy with problem setting for JnU Intra University Programming Contest, He doesn’t want to message them one by one to collect all slides.

He found a file containing info on friends' slide collections. He gives it to you. You should help him by telling him the **minimum** number of friends he should message to collect slides of all subjects.

And also print an array that should contain the list of the friends' IDs so that he can message them. For example, if he should message friend 1 and friend 3. Output [1, 3]

In the case of many solutions print the lexicographically minimum array.

Input

First Line consists of an integer $T(1 \leq T \leq 10^2)-$the number of test cases.

Each test case starts with an integer $N(1 \leq N \leq 10^5)-$ the number of friends he has. You can assume that $(T * N < 2 * 10^6)$.

For the next N lines, given the description of I’th friend’s slides collection.

The I’th line has the number of subjects X (1 <= X <= 4), and then the list of X subjects (Here all the subjects will be unique). Please read the sample input-output for the exact formatting.

Output

Output the **minimum number of friends** he should message to get all the slides.

And then an array containing the IDs of the friends. In the case of many solutions, output lexicographically minimal array.

Array *A* is lexicographically smaller than array *B* if *A[i] < B[i]* where i is the first index where *X* and *Y* differ.

If there is no way to get all slides. then print “Make more friends, Neaj.” without quotes.

Samples

Input	Output
1 1 4 DSA OOP CN DBMS	1 1

Input	Output
1 4 1 DSA 2 OOP DBMS 1 CN 2 DSA CN	2 2 4
He can message 2nd friend for OOP and DBMS, and 4th friend for DSA and NET.	

Input	Output
1 4 3 DSA OOP DBMS 2 DSA OOP 2 CN DBMS 1 CN	2 1 3
He can message only 2 friends to collect all slides. This can be done in 3 possible ways. [1, 3], [1, 4], and [2, 3] are the possible answer, but [1, 3] is the lexicographically minimum array among them.	

Input	Output
1 4 1 DSA 1 OOP 1 DBMS 1 DSA	Make more friends, Neaj.

Input	Output
1 4 2 DBMS CN 2 OOP CN 4 DBMS DSA OOP CN 2 OOP DSA	1 3
[1, 4] is also a solution, But in this case, he needs to message two friends. You should minimize the answer (the minimum number of friends he must message to get all slides), If many possible minimal solutions exist, then the list of friends should be lexicographically minimal.	

Example of the lexicographically minimum array, If

A = [1, 2, 4], and B = [1, 3, 4] then A < B, because in the 2nd position, the values are different, and 2 < 4, so A < B.

A = [2,1 3], and B = [1, 2, 3] then A > B because in the 1st position the value are different and 2 > 1, so A > B

A = [2, 4, 6 7], B = [2, 4, 7, 6] then A < B because in the 3rd position A[i] < B[i]

F. Slim_milS

You are given an integer **n** and a string **s** of length **n**. You are also given **q query,** each query being given two integers **l** and **r.** Let, string **a = s[l...r]** and two arrays **f[]** and **g[]**. Here **f** is the frequency array of string **a**. Where f[‘c’] = is the number of occurrences of character ‘c’ in the string a. For every character, **‘c’** in the string **a,** Let, **g[‘c’]=f[‘c’] %2+1.**

Then you need to create a new string **x** where the g[] array is the new frequency of each character. You have to make x a palindrome. Firstly, you can **rearrange x** as you want. After that, you can perform some operations on string x. In one operation you can **replace a character of x with any other character**, you need to find the **minimum number of operations needed** to make **x** a **palindrome**.

For example string, **a = eessesses**. Here **f['s'] = 5** and **f['e'] = 4**. So the new frequency of the characters will be **g['s'] = (5 % 2) + 1 = 2**, and **g['e'] = (4 % 2) + 1 = 1**. So the new string is x = **sse**. And after rearranging x, x = **ses**. where **ses** is already a palindrome. So don’t need any operation.

A palindrome is a string that reads the same backward as forward, for example, strings "z", "aaa", "aba", "**abccba**" are palindromes, but strings "**codeforces**", "**reality**", and "**ab**" are not.

Input

The first line contains an integer $T(1 \leq T \leq 10^4)-$, the number of test cases.

In each of the test cases, in the first line, you are given an integer $n(1 \leq n \leq 10^5)-$ length of the array.

The second line contains the string s, consisting of lowercase English letters.

In the third line, you are given another integer $q(1 \leq q \leq 10^5)-$ the number of queries.

Next q line you are given two integers $l, r(1 \leq l \leq r \leq n)$.

It is guaranteed that the sum of *n and q* over all test cases does not exceed $2 * 10^5$.

Output

First line print “Case X:” where X is the Xth test case.

Next **q** line prints the minimum number of operations.

Samples

Input	Output
2 8 salimvai 3 1 8 2 8 4 8 20 aabbbccccdddeeeeffff 5 1 20 1 7 1 8 1 9 1 11	Case 1: 1 1 0 Case 2: 2 1 0 1 1

First case: for first query, a = "**salimvai**", f[a] = 2, f[i] = 2, f[l] = 1, f[m] = 1, f[s] = 1, f[v] = 1

so g[a] = 1, g[i] = 1, g[l] = 2, g[m] = 2, g[s] = 2, g[v] = 2

so x = "**aillmmssvv**"

after rearranging x = "**mlvsaisvlm**" (any arbitrary order)

After that if we want to make x a palindrome we need to change in one position, change 'a' to 'i', in **1** operation. Now x is "**mlvsaasvlm**" which is a palindrome.

So the minimum number of operations is **1**.

G. Neaj's Rectangle Cutting

Neaj drew an axis parallel rectangle in his notebook. Now without any reason, he is cutting his rectangle with axis parallel lines. Suddenly he realized that he needs to create some problems for JnU Intra University Programming Contest.

Guess what? He found a good one!

He is giving you **the initial four points of his rectangle** and you need to tell him one thing, **If he cuts his rectangle by an axis parallel line**, what is the **largest area of rectangles touching that line**?

As he cuts his rectangle, again and again, you need to answer all his queries.

Please **read these examples** for a better understanding:

Suppose his initial rectangle is [(0, 0), (0, 10), (10, 0), (10, 10)].

If he cuts his rectangle **by a line x = 5**, then the initial rectangle will be divided into two rectangles: [(0, 0), (0, 5),(5, 0), (5, 10)] and [(5, 0), (5, 10),(10, 0), (10, 10)] and both the rectangles are touching with the line x = 5, and both rectangle's area is 5 * 10 = 50. **So the answer to this query is 50.**

If he again cuts his rectangle by a new line **y = 2**, there will be four rectangles touching this line. [(0, 0), (0, 2),(5, 0), (5, 2)], [(5, 0), (5, 2),(10, 0), (10, 2)], [(0, 2), (0, 10),(5, 2), (5, 10)], and [(5, 2), (5, 10),(10, 2), (10, 10)]. Their areas are 10, 10, 40, and 40. So **the answer is now 40**.

If he again cuts his rectangle by a new line **x = 1**, then there will be a total of 6 rectangles, but four of them are touched by the line x = 1 and their area is 2(1*2), 8(4*2), 8(1*8), 32(4*8). So **the answer will be 32** after this cut.

If he again cuts his rectangle by a new line **y = 1**, then there will be 6 rectangles touching the line y = 1. Their areas are 1, 1, 4, 4, 5, and 5. So **the answer is now 5**.

If he again cuts his rectangle by a new line **y = 9**, then there will be 6 rectangles touching the line y = 9. Among them the maximum area rectangle is [(5, 2), (5, 9), (10, 2), (10, 9)], So **the answer is 35**.

Input

First Line consists of an integer $T(1 \leq T \leq 10)$, the number of test cases.

The first line of each test case input consists of four integers $a, b, c, d(-10^9 \leq a, b, c, d \leq 10^9)$ where $(a, b)$is the **lower left corner**, and (c, d) is the **upper right corner** of **his initial rectangle (axis parallel)**, and **a < c** and **b < d.**

Next line you are given an integer $C(1 \leq C \leq 10^5)$, which denotes the number of cutting lines. Next, in C lines you are given the equation of those lines $x = p$ or $y = q$. And $x = p(a < p < c)$denotes a vertical line and $y = q(b < q < d)$ denotes a horizontal line. **Each p will be unique and each q will be unique.** Both p and q are integers.

Output

Output C integer, the largest area of rectangles touching the I'th line if he cuts the rectangle by I'th line. Please read the sample input-output for the exact formatting.

Samples

Input	Output
1 0 0 10 10 5 x = 5 y = 2 x = 1 y = 1 y = 9	50 40 32 5 35

The equation is given in exact format as given in sample input. "x = p" or "y = q". There will be a space before and after the '=' sign.

H. FIFA World Cup and ICPC Preliminary

Do you know who is the winner of the 2022 World Cup? Yes, it's Argentina and Messi. It’s not ICPC preliminary :) XD. Now proceed to the main problem.

You know, Barcelona plays in La Liga, and Man City plays in EPL. In EPL or Laliga the match time is 90 minutes, there are no extra 30 minutes or tie-breakers in case of a draw. Sometimes EPL and La Liga matches are played at the same time.

As ash_98 is a fan of Man City and Barcelona, he never misses a match of these two clubs. If these two clubs have a match at the same time, he watches the Barcelona match on his laptop and the Man City match on his mobile. If you are (not) a supporter of these clubs, he has found something for you. You are given Barcelona and Man City match schedules in the start and end time format (in minutes). You have to say **the total number of minutes or the total time duration** he watches Barcelona or Man City matches.

If Barcelona has 2 matches on the schedule [2,91],[101,190] and Man City has 1 match on the schedule [5,94] then he watches all the 3 matches in $2^{nd}, 3^{rd}, 4^{th}, \ldots\ldots, 93^{th}, 94^{th}, 101^{th}, 102^{th}, \ldots, 190^{th}$ minute. So, the answer is 183.

Input

The first line of the test case contains two integers $n$and $m(1 \leq n, m \leq 10^4)-$the number of scheduled matches for Barcelona and the number of scheduled matches for Man City.

Next n line contains two integers $s_i$and $t_i(1 \leq s_i < t_i \leq 10^6)-$start and ending time of i_{th}match. It is guaranteed that $(t_i - s_i + 1 = 90)$and **no two Barcelona matches overlapped.**

Next m line contains two integers $s_j$and $t_j(1 \leq s_j < t_j \leq 10^6)-$start and ending time of j_{th}match. It is guaranteed that $(t_j - s_j + 1 = 90)$and **no two Man City matches overlapped.**

Output

output an integer **the total number of minutes or the total time duration** he watches Barcelona or Man City matches.

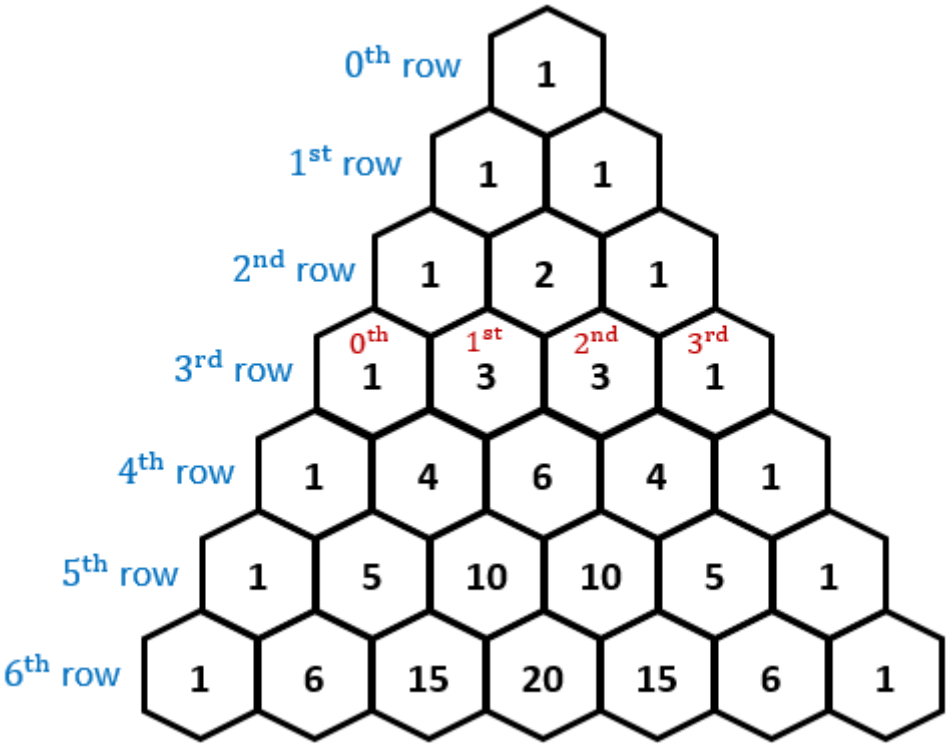
Samples

Input	Output
2 1 2 91 101 190 5 94	183

Input	Output
1 1 1 90 2 91	91

I. Almost Giveway

In mathematics, Pascal's triangle is a triangular array of binomial coefficients that arise in probability theory, combinatorics, and algebra. The rows of Pascal's triangle are conventionally enumerated starting with row **n=0 at the top (the 0th row)**. The entries in each row are numbered from the left beginning with k=0 and are usually staggered relative to the numbers in the adjacent rows. The triangle may be constructed in the following manner: In row 0 (the topmost row), there is a unique nonzero entry 1. Each entry of each subsequent row is constructed by adding the number above and to the left with the number above and to the right, treating blank entries as 0.



In this problem, you are given the row number. You have to print the sum of all the values of this row in the Pascal Triangle.

For example, **the sum of row 0 is 1, and the sum of row 2 is 1+2+1=4.**

Input

The input will contain one integer $N(0 \leq N < 30)$

Output

Print the sum of the Nth row of Pascal's triangle.

Samples

Input	Output
0	1

Input	Output
2	4