CCPC 2016 Hangzhou Site

Problems

Problem A. ArcSoft's Office Rearrangement

ArcSoft, Inc. is a leading global professional computer photography and computer vision technology company.

There are N working blocks in ArcSoft company, which form a straight line. The CEO of ArcSoft thinks that every block should have equal number of employees, so he wants to re-arrange the current blocks into K new blocks by the following two operations:

1. merge two neighbor blocks into a new block, and the new block's size is the sum of two old blocks'.
2. split one block into two new blocks, and you can assign the size of each block, but the sum should be equal to the old block.

Now the CEO wants to know the **minimum** operations to re-arrange current blocks into K block with equal size, please help him.

Input

First line contains an integer T, which indicates the number of test cases.

Every test case begins with one line which two integers N and K, which is the number of old blocks and new blocks.

The second line contains N numbers $a_1, a_2, \cdots, a_N$, indicating the size of current blocks.

Output

For every test case, you should output '`Case #x: y`', where `x` indicates the case number and counts from `1` and `y` is the minimum operations.

If the CEO can't re-arrange K new blocks with equal size, `y` equals `-1`.

Limits

- $1 \leq T \leq 100$
- $1 \leq N \leq 10^5$
- $1 \leq K \leq 10^5$
- $1 \leq a_i \leq 10^5$

Sample input and output

Sample Input	Sample Output
3 1 3 14 3 1 2 3 4 3 6 1 2 3	Case #1: -1 Case #2: 2 Case #3: 3

Problem B. Bomb

There are N bombs needing exploding.

Each bomb has three attributes: exploding radius r_i, position (x_i, y_i) and lighting-cost c_i which means you need to pay c_i cost making it explode.

If a un-lighting bomb is under the exploding area of another exploding one, the un-lighting bomb also will explode.

Now you know the attributes of all bombs, please use the **minimum** cost to explode all bombs.

Input

First line contains an integer T, which indicates the number of test cases.

Every test case begins with an integers N, which indicates the numbers of bombs.

In the following N lines, the ith line contains four intergers x_i, y_i, r_i and c_i, indicating the coordinate of ith bomb is (x_i, y_i), exploding radius is r_i and lighting-cost is c_i.

Output

For every test case, you should output '`Case #x: y`', where `x` indicates the case number and counts from `1` and `y` is the minimum cost.

Limits

- $1 \leq T \leq 20$
- $1 \leq N \leq 1000$
- $-10^8 \leq x_i, y_i, r_i \leq 10^8$
- $1 \leq c_i \leq 10^4$

Sample input and output

Sample Input	Sample Output
1 5 0 0 1 5 1 1 1 6 0 1 1 7 3 0 2 10 5 0 1 4	Case #1: 15

Problem C. Car

Ruins is driving a car to participating in a programming contest. As on a very tight schedule, he will drive the car without any slow down, so the speed of the car is non-decrease.

Of course, his speeding caught the attention of the traffic police. Police record N positions of Ruins without time mark, the only thing they know is every position is recorded at an integer time point and Ruins started at 0.

Now they want to know the **minimum** time that Ruins used to pass the last position.

Input

First line contains an integer T, which indicates the number of test cases.

Every test case begins with an integers N, which is the number of the recorded positions.

The second line contains N numbers a_1, a_2, $\cdots$, a_N, indicating the recorded positions.

Output

For every test case, you should output '`Case #x: y`', where `x` indicates the case number and counts from `1` and `y` is the minimum time.

Limits

- $1 \leq T \leq 100$
- $1 \leq N \leq 10^5$
- $0 < ai \leq 10^9$
- $a_i < a_{i+1}$

Sample input and output

Sample Input	Sample Output
1 3 6 11 21	Case #1: 4

Problem D. Difference

Little Ruins is playing a number game, first he chooses two numbers y and K and calculates $f(y, K)$, here

$$f(y, K) = \sum_{z \text{ in every digits of } y} z^K$$

then he gets the result

$$x = f(y, K) - y$$

As Ruins is forgetful, a few seconds later, he only remembers K, x and forgets y. please help him find how many y satisfy $x = f(y, K) - y$.

Input

First line contains an integer T, which indicates the number of test cases.

Every test case contains one line with two integers x, K.

Output

For every test case, you should output '`Case #x: y`', where `x` indicates the case number and counts from `1` and `y` is the result.

Limits

- $1 \leq T \leq 100$
- $0 \leq x \leq 10^9$
- $1 \leq K \leq 9$

Sample input and output

Sample Input	Sample Output
2 2 2 3 2	Case #1: 1 Case #2: 2

Problem E. Equation

Little Ruins is a studious boy, recently he learned addition operation! He was rewarded some number bricks of 1 to 9 and infinity bricks of addition mark '+' and equal mark '='.

Now little Ruins is puzzled by those bricks because he wants to put those bricks into as many different addition equations form $x + y = z$ as possible. Each brick can be used at most once.

As Ruins is a beginer of addition operation, x, y and z will be single digit number.

Two addition equations are different if any number of x, y and z is different.

Please help little Ruins to calculate the **maximum** number of different addition equations.

Input

First line contains an integer T, which indicates the number of test cases.

Every test case contains one line with nine integers, the i^{th} integer indicates the number of bricks of i.

Output

For every test case, you should output '`Case #x: y`', where `x` indicates the case number and counts from `1` and `y` is the result.

Limits

- $1 \leq T \leq 30$.
- $0 \leq$ bricks number of each type ≤ 100.

Sample input and output

Sample Input	Sample Output
3 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 0 3 3 0 3 0 0 0 0	Case #1: 2 Case #2: 6 Case #3: 2

Problem F. Four Operations

Little Ruins is a studious boy, recently he learned the four operations!

Now he want to use four operations to generate a number, he takes a string which only contains digits '1' - '9', and split it into 5 intervals and add the four operations '+', '-', '*' and '/' in order, then calculate the result.

Now please help him to get the largest result.

Input

First line contains an integer T, which indicates the number of test cases.

Every test contains one line with a string only contains digits '1'-'9'.

Output

For every test case, you should output 'Case #x: y', where x indicates the case number and counts from 1 and y is the result.

Limits

- $1 \leq T \leq 10^5$
- $5 \leq$ length of string ≤ 20

Sample input and output

Sample Input	Sample Output
1 12345	Case #1: 1

Problem G. Game of Eliminate

Little Ruins is a studious boy, but in rest time, he will play some little game.

Today he found a game of eliminate: there is $N \times M$ tiles which only contains '`#`' and '`*`', you have two patterns to eliminate tiles:

.
..

and

 .
..

Each step you can use a pattern and eliminate tiles **on the bottom two lines**. After each step,the tiles above eliminated tiles will fall down.

Your goal is to eliminate all '`*`' tiles, please calculate the **minimum** steps.

Input

First line contains an integer T, which indicates the number of test cases.

Every test case begins with two integers N and M, which indicates the size of tiles.

In the following N lines, every line contains M characters means the type of tiles.

Output

For every test case, you should output '`Case #x: y`', where `x` indicates the case number and counts from `1` and `y` is the result.

Limits

- $1 \leq T \leq 50$.
- $1 \leq N, M \leq 2000$.
- For 80% of the use cases, $1 \leq N, M \leq 100$ holds.

Sample input and output

Sample Input	Sample Output
1 3 2 #* *# ##	Case #1: 2

Problem H. Hazy String

Archaeologists find an ancient string on a monument, but some characters have become hazy with the passage of time, and we only know the remain characters.

Now archaeologists want to re-build the string, and know two rules:

1. there is no palindrome substring in the original string. **Note that a single character is not regarded as a palindrome string here**.
2. the character set size of the original string is K.

Please calculate the number of original string which satisfy above rules.

Input

First line contains an integer T, which indicates the number of test cases.

Every test case begins with three integers N, K and L, which is the number of known characters, the character set size of the original string and the length of the original string.

Then N lines follow, the i^{th} line contains two integers p_i and v_i, means the position and value of i^{th} known character.

Output

For every test case, you should output '`Case #x: y`', where `x` indicates the case number and counts from `1` and `y` is the result.

Because `y` could be very large, just mod it with $10^9 + 7$.

Limits

- $1 \leq T \leq 100$.
- $0 \leq N \leq 2000$.
- $1 \leq K \leq 10^9$.
- $max(1, N) \leq L \leq 10^9$.
- $0 \leq p_i < p_{i+1} < L$.
- $0 \leq v_i < K$
- For 90% of the use cases, $N \leq 10$ holds.

Sample input and output

Sample Input	Sample Output
3 0 3 4 1 4 4 1 1 2 5 5 1 1 3 2	Case #1: 6 Case #2: 12 Case #3: 27

Problem I. Inequality

Little Ruins is a studious boy, recently he learned inequation!

As homework, his teacher gives him a problem of inequation: give you an array a with length $N-1$, please find an array x with length N and satisfied with $x_i \times x_{i+1} \geq a_i$ for each i from 1 to $N-1$ and try to **minimize** the sum of x.

Input

First line contains an integer T, which indicates the number of test cases.

Every test case begins with an integers N, which is the length of array x.

The second line contains $N-1$ numbers a_1, a_2, $\cdots$, a_{N-1}, indicating the array a.

Output

For every test case, you should output '`Case #x: y`', where `x` indicates the case number and counts from `1` and `y` is the result.

Round the `y` to the fifth digit after the decimal point.

Limits

- $1 \leq T \leq 50$.
- $1 \leq N \leq 2000$.
- $0 < a_i \leq 10^4$.
- For 80% of the use cases, $1 \leq N \leq 100$ holds.

Sample input and output

Sample Input	Sample Output
2 4 2 3 2 4 1 2 3	Case #1: 5.77350 Case #2: 5.47723

Problem J. Just a Math Problem

Little Ruins is a studious boy, recently he learned math!

Now he defines $f(k)$ equal the number of prime factors in k, and $g(k) = 2^{f(k)}$, he want to know

$$\sum_{i=1}^{n} g(i)$$

Please help him!

Input

First line contains an integer T, which indicates the number of test cases.

Every test case contains one line with one integer n.

Output

For every test case, you should output '`Case #x: y`', where `x` indicates the case number and counts from `1` and `y` is the result.

Because `y` could be very large, just mod it with $10^9 + 7$.

Limits

- $1 \leq T \leq 50$.
- $1 \leq n \leq 10^{12}$.

Sample input and output

Sample Input	Sample Output
3 1 10 100	Case #1: 1 Case #2: 23 Case #3: 359

Problem K. Kingdom of Obsession

There is a kindom of obsession, so people in this kingdom do things very strictly.

They name themselves in integer, and there are n people with their id continuous $(s+1, s+2, \cdots, s+n)$ standing in a line, be more obsessively, people with id x wants to stand at y^{th} position which satisfy

$$x \mod y = 0$$

Is there any way to satisfy everyone's requirement?

Input

First line contains an integer T, which indicates the number of test cases.

Every test case contains one line with two integers n, s.

Output

For every test case, you should output '`Case #x: y`', where `x` indicates the case number and counts from `1` and `y` is the result string.

If there is any way to satisfy everyone's requirement, `y` equals '`Yes`', otherwise `y` equals '`No`',

Limits

- $1 \leq T \leq 100$.
- $1 \leq n \leq 10^9$.
- $0 \leq s \leq 10^9$.

Sample input and output

Sample Input	Sample Output
2 5 14 4 11	Case #1: No Case #2: Yes