Eid Code Quest - UAP

Schedule

The contest will run for **2h30m0s**.

Authors

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Rules

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

You can use C++20 GCC 13.2, Java 1.8, PyPy 7.1 (3.6), and Python 3.12 in this contest.

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

Notes

There are 6 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. Math is L+ve

Ans whether the arithmetic operations are correct or not.

Input

First line contains the number of arithmetic operations N (1 ≤ N ≤ 100).

Each testcase contains a single line having a, b, c. Where values of them are 1 ≤ (b < a) ≤ 9 and 1 ≤ c ≤ 9.

The operations will be one of these two formats:

1. a+b=c

2. a-b=c

Output

If it is correct print YES otherwise NO. You can output "YES" and "NO" in any case (for example, strings "yES", "yes" and "Yes" will be recognized as a positive response).

Samples

Input	Output
3 3+1=4 4 - 1=5 2 - 1=1	YES NO YES

B. Or & Xor

Given an array of length *N*. Array values are fixed in their positions. You have to replace **"?"** with logical **OR**, **AND** or **XOR** in such a way that the array sum is maximized.

$$\sum_{i=2}^{N}(a_{i-1}\,?\,a_i) = (a_1\,?\,a_2) + (a_3\,?\,a_4) + (a_5\,?\,a_6) + \cdots \ldots \ldots \ldots + (a_{n-1}\,?\,a_n)$$

[Here, i = 2, 4, 6...N]

As an example, If N = 8 and a = [1, 2, 1, 1, 4, 8, 10, 5]. One possible way to get maximum sum is:

$$(1 \mid 2) + (1 \,\&\, 1) + (4 \mid 8) + (10 \oplus 5) = 31$$

If there are multiple ways to get the maximum sum you can follow any of them.

Input

First line contains the number of testcases T (1 ≤ T ≤ 100).

Each testcase contains an integers N (1 ≤ N ≤ 10^5) and of course N will be an even number.

Next line contains N integers *a1, a2, a3......aN* where (1 ≤ *ai* ≤ 10^9).

Output

Output the maximum possible array sum after replacing **?** with logical OR, AND or XOR.

Samples

Input	Output
3 2 6 16 4 12 12 12 12 8 1 2 1 1 4 8 10 5	22 24 31

Input	Output

Explanations:

First test case, $6 \oplus 16 = 22$.

Second test case, $(12 \,\&\, 12) + (12 \,\&\, 12) = 24$.

C. Eid Mubarak

You went on a shopping with your father for Eid. He showed you N clothes, and you have M opinions about each one. How many different combination of opinions you can give for all those clothes?

Suppose he showed you 2 cloths and you have 3 opinions as Liked, Disliked and Maybe. All 9 possible different combination of opinions are given below.

As the answer can be so huge, print answer %$10^9 + 7$

Input

First line contains the number of testcases T (1 ≤ T ≤ 100).

Each testcase contains two integers N and M (1 ≤ N, M ≤ 10^5) denoting the number of Cloths and the number Opinions.

Output

Print the total number of different choices that you can make.

Samples

Input	Output
2 1 1 2 3	1 9

Input	Output

Second testcase is explained in the statements.

D. Cow Stall

A cow stall have N cows. Each cow is denotated by a single color (i.e. R = red cow, W = white cow, B = black cow and many more). If a cow is sold, a new cow is placed in that place [total number of cows remains the same]. The new cow can be of any color (may be a new color or same as the previous one).

You will be given a string of length N representing the cows, Q number of queries and a favorite color of cow. There will be two kinds of query:

1. If query starts with zero, take two integers *l, r.* And count how many favorite cows are still in the stall from *l* to *r* range inclusive and print the answer.

2. If query starts with one, that means a cow is sold, now take two inputs *i* and *c*. Here *i* is the index of the previous cow and *c* is the new cow. Place the new cow in the *i* th position.

Input

First line contains the number of testcases T (1 ≤ T ≤ 10).

Each testcase contains two integers *N*, *Q* and a character *F*. Where ($1 \le N, Q \le 10^5$) and ($A \le F \le Z$) representing N = number of cows, Q = number of queries, F = favorite colored cow.

Second line contains the string S. Where S represents the colors of each cow of the stall.

Third line contains Q queries. Where ($1 \le i, l, r \le N$) and ($A \le c \le Z$).

Output

The string updates each time a query starts with 1. So print the answers accordingly.

Samples

Input	Output
1 7 3 R RWRBBWR 0 1 7 1 5 R 0 1 7	3 4

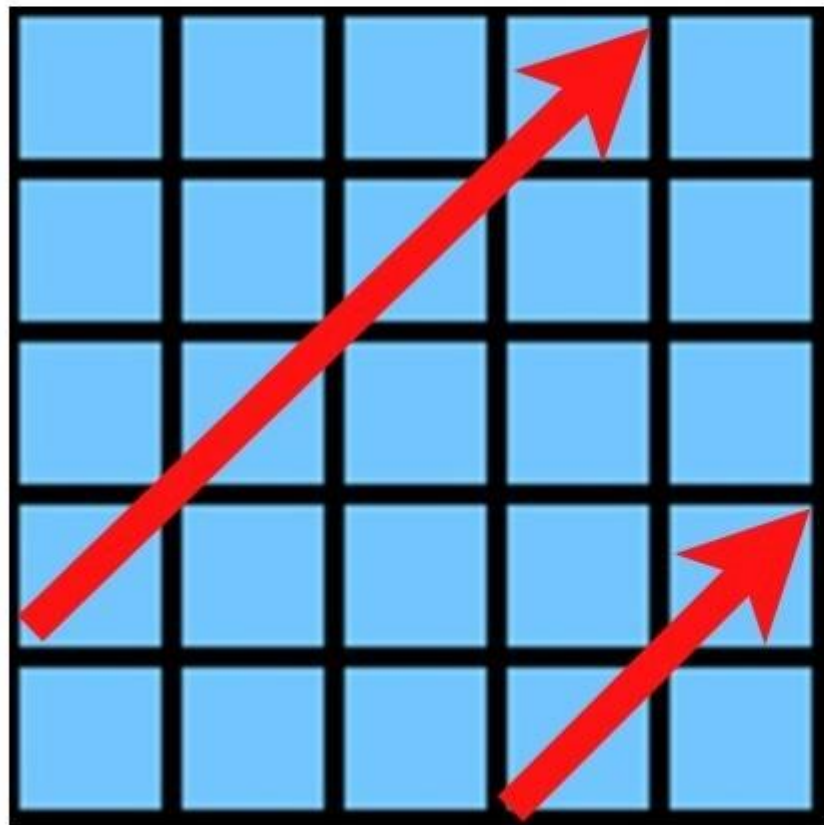| Input	Output
1 12 9 X OXPARXXBGTZS 0 1 12 1 2 X 0 1 12 1 3 X 0 1 12 1 6 J 1 7 A 0 1 7 1 12 E	3 3 4 2

E. Apple Tree

A square apple tree is of size _NxN_. The tree has apple **"@"** and leaf **"O"**.

You have to do the following:

1. Choose one of the following three direction from which side you are going to shoot the crossbow:

2.

Once You selected a direction, you can not change it.

3. You have K crossbow bolts to shoot.

Print the maximum number of apples you can get.

Input

First line contains an integer N (1 ≤ N ≤ 100) and K (1 ≤ K ≤ 2N-1).

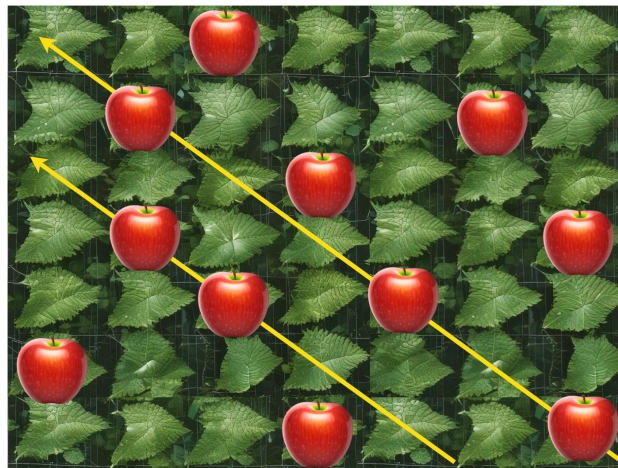Then comes the 2D tree where apples are **"@"** and leaf **"O"**.

Output

Print the maximum number of apples you can get.

Samples

Input	Output
7 2 00@0000 0@000@0 000@000 0@0000@ 00@0@00 @000000 000@00@	5

Explanations: If you choose the right to left diagonal, then you will get the maximum number of apples. Which is 5 in this case.

F. Friends & Donation

N friends went on a tour. Each friend have *ai* dollars in 1$ coins. They saw a NGO which works for Animal Welfare. This NGO rescues animals and takes care of them until they are fully recovered. This organization needs minimum *M* amount of donation. To contribute, the friends decided to follow a method where N friends stand in a line side by side and they put all the coins in front of them on a table. A volunteer from the NGO will collect all the coins of the current row from left to right. Every time the volunteer collects a row, he starts again from the left. This continues until the volunteer either reaches the right end with at least M amount of dollars or all the friends run out of money. What is the maximum amount of money a friend individually (among them) will have so that the amount M is also collected?

If they fail to help the NGO then print -1. We have to find how many rows left, after donation.

Input

First line contains the number of testcases T (1 ≤ T ≤ 10^4).

Each testcase contains a number N (1 ≤ N ≤ 10^5) and M (1 ≤ M ≤ 10^9)
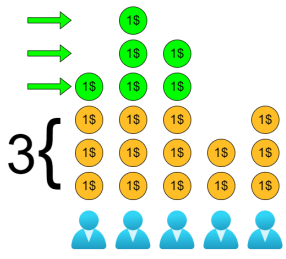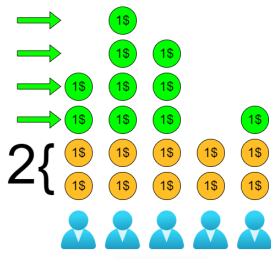
Next line contains N integers a1, a2, a3 … aN (1 ≤ ai ≤ 10^9).

Output

Print the minimum possible amount a friend can contribute so that M amount is collected.

Samples

Input	Output
3 5 6 4 6 5 2 3 5 7 4 6 5 2 3 7 8 1 1 1 2 1 1 1	3 2 0

Input	Output
Testcase 1 Testcase 2	

In the first testcase, the volunteer got 6 dollars after collecting 3 rows **then 3 rows left (Yellow marked coins) so answer is 3.**

In the second testcase, the volunteer did not got 7 dollars after collecting 3 rows, so he went for next row. Even after getting M=7 coins the volunteer collected coins from forth row completely as per the rule. **After that only two rows left (Yellow marked coins) so the answer is 2.**

In the third testcase, all coins were donated.