Codeforces Round #806 (Div. 4)

A. YES or YES?

1 second, 256 megabytes

There is a string s of length 3, consisting of uppercase and lowercase English letters. Check if it is equal to "YES" (without quotes), where each letter can be in any case. For example, "yES", "Yes", "yes" are all allowable.

Input

The first line of the input contains an integer t ($1 \le t \le 10^3$) — the number of testcases.

The description of each test consists of one line containing one string s consisting of three characters. Each character of s is either an uppercase or lowercase English letter.

Output

For each test case, output "YES" (without quotes) if s satisfies the condition, and "NO" (without quotes) otherwise.

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

input
10 YES yES yes Yes YeS Noo orZ yEz Yas XES

output
YES YES YES YES YES NO NO NO NO NO

The first five test cases contain the strings "YES", "yES", "yes", "Yes", "YeS". All of these are equal to "YES", where each character is either uppercase or lowercase.

B. ICPC Balloons

1 second, 256 megabytes

In an ICPC contest, balloons are distributed as follows:

- Whenever a team solves a problem, that team gets a balloon.
- The first team to solve a problem gets an additional balloon.

A contest has 26 problems, labelled A, B, C, ..., Z. You are given the order of solved problems in the contest, denoted as a string s, where the i-th character indicates that the problem s_i has been solved by some team. No team will solve the same problem twice.
Determine the total number of balloons that the teams recieved. Note that some problems may be solved by none of the teams.

Input

The first line of the input contains an integer t ($1 \le t \le 100$) — the number of testcases.

The first line of each test case contains an integer n ($1 \le n \le 50$) — the length of the string.

The second line of each test case contains a string s of length n consisting of uppercase English letters, denoting the order of solved problems.

Output

For each test case, output a single integer — the total number of balloons that the teams received.

input
6 3 ABA 1 A 3 ORZ 5 BAAAA 4 BKPT 10 CODEFORCES
output
5 2 6 7 8 17

In the first test case, 5 balloons are given out:

- Problem A is solved. That team receives 2 balloons: one because they solved the problem, an an additional one because they are the first team to solve problem A.
- Problem B is solved. That team receives 2 balloons: one because they solved the problem, an an additional one because they are the first team to solve problem B.
- Problem A is solved. That team receives only 1 balloon, because they solved the problem. Note that they don't get an additional balloon because they are **not** the first team to solve problem A.

The total number of balloons given out is $2 + 2 + 1 = 5$.
In the second test case, there is only one problem solved. The team who solved it receives 2 balloons: one because they solved the problem, an an additional one because they are the first team to solve problem A.

C. Cypher

1 second, 256 megabytes

Luca has a cypher made up of a sequence of n wheels, each with a digit a_i written on it. On the i-th wheel, he made b_i moves. Each move is one of two types:

- *up* move (denoted by `U`): it increases the i-th digit by 1. After applying the up move on 9, it becomes 0.
- *down* move (denoted by `D`): it decreases the i-th digit by 1. After applying the down move on 0, it becomes 9.

Example for $n = 4$. The current sequence is `0 0 0 0`.

Luca knows the final sequence of wheels and the moves for each wheel. Help him find the original sequence and crack the cypher.

Input

The first line contains a single integer t ($1 \le t \le 100$) — the number of test cases.

The first line of each test case contains a single integer n ($1 \le n \le 100$) — the number of wheels.

The second line contains n integers a_i ($0 \le a_i \le 9$) — the digit shown on the i-th wheel after all moves have been performed.

Then n lines follow, the i-th of which contains the integer b_i ($1 \le b_i \le 10$) and b_i characters that are either `U` or `D` — the number of moves performed on the i-th wheel, and the moves performed. `U` and `D` represent an *up* move and a *down* move respectively.

Output

For each test case, output n space-separated digits — the initial sequence of the cypher.

input

```
3
3
9 3 1
3 DDD
4 UDUU
2 DU
2
0 9
9 DDDDDDDDD
9 UUUUUUUUU
5
0 5 9 8 3
10 UUUUUUUUUU
3 UUD
8 UUDUUDDD
10 UUDUUDUDDU
4 UUUU
```

output

```
2 1 1
9 0
0 4 9 6 9
```

In the first test case, we can prove that initial sequence was $[2, 1, 1]$. In that case, the following moves were performed:

- On the first wheel: $2 \xrightarrow{\texttt{D}} 1 \xrightarrow{\texttt{U}} 0 \xrightarrow{\texttt{D}} 9$.
- On the second wheel: $1 \xrightarrow{\texttt{D}} 2 \xrightarrow{\texttt{D}} 1 \xrightarrow{\texttt{U}} 2 \xrightarrow{\texttt{U}} 3$.
- On the third wheel: $1 \xrightarrow{\texttt{D}} 0 \xrightarrow{\texttt{U}} 1$.

The final sequence was $[9, 3, 1]$, which matches the input.

D. Double Strings

2 seconds, 256 megabytes

You are given n strings $s_1, s_2, \ldots, s_n$ of length at most 8.

For each string s_i, determine if there exist two strings s_j and s_k such that $s_i = s_j + s_k$. That is, s_i is the concatenation of s_j and s_k. Note that j **can** be equal to k.

Recall that the concatenation of strings s and t is $s + t = s_1 s_2 \ldots s_p t_1 t_2 \ldots t_q$, where p and q are the lengths of strings s and t respectively. For example, concatenation of "`code`" and "`forces`" is "`codeforces`".

Input

The first line contains a single integer t ($1 \le t \le 10^4$) — the number of test cases.

The first line of each test case contains a single integer n ($1 \le n \le 10^5$) — the number of strings.

Then n lines follow, the i-th of which contains non-empty string s_i of length at most 8, consisting of lowercase English letters. Among the given n strings, there may be equal (duplicates).

The sum of n over all test cases doesn't exceed 10^5.

Output

For each test case, output a binary string of length n. The i-th bit should be `1` if there exist two strings s_j and s_k where $s_i = s_j + s_k$, and `0` otherwise. Note that j can be equal to k.

input

```
3
5
abab
ab
abc
abacb
c
3
x
xx
xxx
8
codeforc
es
codes
cod
forc
forces
e
code
```

output

```
10100
011
10100101
```

In the first test case, we have the following:

- $s_1 = s_2 + s_2$, since `abab` $=$ `ab` $+$ `ab`. Remember that j can be equal to k.
- s_2 is not the concatenation of any two strings in the list.
- $s_3 = s_2 + s_5$, since `abc` $=$ `ab` $+$ `c`.
- s_4 is not the concatenation of any two strings in the list.
- s_5 is not the concatenation of any two strings in the list.

Since only s_1 and s_3 satisfy the conditions, only the first and third bits in the answer should be `1`, so the answer is `10100`.

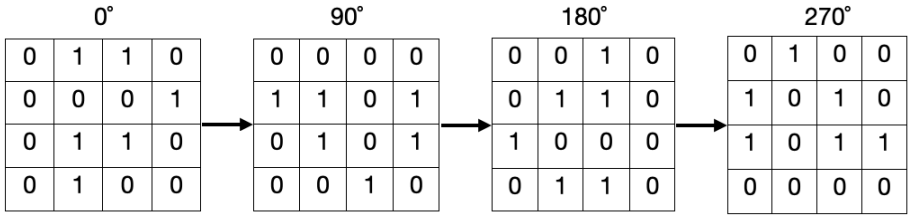
E. Mirror Grid

2 seconds, 256 megabytes

You are given a square grid with n rows and n columns. Each cell contains either 0 or 1.

In an operation, you can select a cell of the grid and flip it (from $0 \to 1$ or $1 \to 0$). Find the minimum number of operations you need to obtain a square that remains the same when rotated 0°, 90°, 180° and 270°.

The picture below shows an example of all rotations of a grid.



Input

The first line contains a single integer t ($1 \le t \le 100$) — the number of test cases.

The first line of each test case contains a single integer n ($1 \le n \le 100$) — the size of the grid.

Then n lines follow, each with n characters $a_{i,j}$ ($0 \le a_{i,j} \le 1$) — the number written in each cell.

Output

For each test case output a single integer — the minimum number of operations needed to make the square look the same rotated 0°, 90°, 180° and 270°.

input

```
5
3
010
110
010
1
0
5
11100
11011
01011
10011
11000
5
01000
10101
01010
00010
01001
5
11001
00000
11111
10110
01111
```

output

```
1
0
9
7
6
```

In the first test case, we can perform one operations to make the grid

$0 \quad 1 \quad 0$

$1 \quad 1 \quad 1$. Now, all rotations of the square are the same.

$0 \quad 1 \quad 0$

In the second test case, all rotations of the square are already the same, so we don't need any flips.

F. Yet Another Problem About Pairs Satisfying an Inequality

2 seconds, 256 megabytes

You are given an array $a_1, a_2, \ldots a_n$. Count the number of pairs of indices $1 \le i, j \le n$ such that $a_i < i < a_j < j$.

Input

The first line contains an integer t ($1 \le t \le 1000$) — the number of test cases.

The first line of each test case contains an integer n ($2 \le n \le 2 \cdot 10^5$) — the length of the array.

The second line of each test case contains n integers $a_1, a_2, \ldots, a_n$ ($0 \le a_i \le 10^9$) — the elements of the array.

It is guaranteed that the sum of n across all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, output a single integer — the number of pairs of indices satisfying the condition in the statement.

Please note, that the answer for some test cases won't fit into 32-bit integer type, so you should use at least 64-bit integer type in your programming language (like `long long` for C++).

input

```
5
8
1 1 2 3 8 2 1 4
2
1 2
10
0 2 1 6 3 4 1 2 8 3
2
1 1000000000
3
0 1000000000 2
```

output

```
3
0
10
0
1
```

For the first test cases the pairs are $(i, j) = \{(2, 4), (2, 8), (3, 8)\}$.

- The pair $(2, 4)$ is true because $a_2 = 1$, $a_4 = 3$ and $1 < 2 < 3 < 4$.
- The pair $(2, 8)$ is true because $a_2 = 1$, $a_8 = 4$ and $1 < 2 < 4 < 8$.
- The pair $(3, 8)$ is true because $a_3 = 2$, $a_8 = 4$ and $2 < 3 < 4 < 8$.

G. Good Key, Bad Key

3 seconds, 256 megabytes

There are n chests. The i-th chest contains a_i coins. You need to open all n chests **in order from chest 1 to chest n**.

There are two types of keys you can use to open a chest:

- a good key, which costs k coins to use;
- a bad key, which does not cost any coins, but will halve all the coins in each unopened chest, **including the chest it is about to open**. The halving operation **will round down** to the nearest integer for each chest halved. In other words using a bad key to open chest i will do $a_i = \lfloor \frac{a_i}{2} \rfloor, a_{i+1} = \lfloor \frac{a_{i+1}}{2} \rfloor, \ldots, a_n = \lfloor \frac{a_n}{2} \rfloor$;
- any key (both good and bad) breaks after a usage, that is, it is a one-time use.

You need to use in total n keys, one for each chest. Initially, you have no coins and no keys. If you want to use a good key, then you need to buy it.

During the process, you are allowed to go into debt; for example, if you have 1 coin, you are allowed to buy a good key worth $k = 3$ coins, and your balance will become -2 coins.

Find the maximum number of coins you can have after opening all n chests in order from chest 1 to chest n.

Input

The first line contains a single integer t ($1 \le t \le 10^4$) — the number of test cases.

The first line of each test case contains two integers n and k ($1 \le n \le 10^5$; $0 \le k \le 10^9$) — the number of chests and the cost of a good key respectively.

The second line of each test case contains n integers a_i ($0 \le a_i \le 10^9$) — the amount of coins in each chest.

The sum of n over all test cases does not exceed 10^5.

Output

For each test case output a single integer — the maximum number of coins you can obtain after opening the chests in order from chest 1 to chest n.

Please note, that the answer for some test cases won't fit into 32-bit integer type, so you should use at least 64-bit integer type in your programming language (like `long long` for C++).

input

```
5
4 5
10 10 3 1
1 2
1
3 12
10 10 29
12 51
5 74 89 45 18 69 67 67 11 96 23 59
2 57
85 60
```

output

```
11
0
13
60
58
```

In the first test case, one possible strategy is as follows:

- Buy a good key for 5 coins, and open chest 1, receiving 10 coins. Your current balance is $0 + 10 - 5 = 5$ coins.
- Buy a good key for 5 coins, and open chest 2, receiving 10 coins. Your current balance is $5 + 10 - 5 = 10$ coins.
- Use a bad key and open chest 3. As a result of using a bad key, the number of coins in chest 3 becomes $\left\lfloor \frac{3}{2} \right\rfloor = 1$, and the number of coins in chest 4 becomes $\left\lfloor \frac{1}{2} \right\rfloor = 0$. Your current balance is $10 + 1 = 11$.
- Use a bad key and open chest 4. As a result of using a bad key, the number of coins in chest 4 becomes $\left\lfloor \frac{0}{2} \right\rfloor = 0$. Your current balance is $11 + 0 = 11$.

At the end of the process, you have 11 coins, which can be proven to be maximal.

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