Fill The Cube

Problem Description

A company manufactures walls which can be directly implanted at the site. The company uses small square bricks of material C and material D which have similar looks but have huge difference in quality. The company manufactures walls of square shapes only to optimize their costs.

A novice employee created a square wall using bricks of material C and D. However, the client had asked the wall to be made of only high-quality material - material C.

To solve this problem, they will place the wall in a special furnace and heat it such that the material D melts and only material C remains. Material C brick will move down due to gravity if a material D brick below it melts. The new empty space created will be filled by new material C square walls. They also want to use biggest possible C square wall while building the final wall. For this they will position the wall in the furnace in an optimal way i.e. rotate by 90-degrees any number of times, if required, such that the biggest space possible for new material C wall is created. No rotations are possible when the furnace starts heating.

Given the structure of the original wall created by the novice employee, you need to find out the size of the new C square wall which can be fitted in the final wall which will be delivered to the client.

Constraints

$1 < N < 100$

Input

First Line will provide the size of the original wall N.

Next N lines will provide the type of material (C and D) used for each brick by the novice employee.

Output

Size of the biggest possible C square wall which can be fitted in the final wall.

Time Limit

1

Examples

Example 1

Input

4

C D C D

C C D C

D D D D

C D D D

Output

3

Explanation

If the wall is placed with its left side at the bottom, space for a new C wall of size 2x2 can be created. This can be visualized as follows

D C D D

C D D D

D C D D

C C D C

The melted bricks can be visualized as follows

- - - -

- C - -

C C - -

C C - C

Hence, the maximum wall size that can be replaced is 2x2.

If the wall is placed as it is with its original bottom side at the bottom, space for a new C wall of size 3x3 can be created. Post melting, this can be visualized as follows.

- - - -

C - - -

C - - -

C C C C

Hence, the maximum wall size that can be replaced is 3x3 in this approach.

Since no rotations followed by heating is going to a yield a space greater than 3x3, the output is 3.

Example 2

Input

7

C D D C D D D

C D D C D D D

D D D D D D C

D C D C D D D

D D D C D C D

C D D C D C C

C D C D C C C

Output

5

Explanation

If the wall is placed with its left side at the bottom, a space for new C wall of size 5x5 can be created. This can be visualized as follows

D D C D D C C

D D D D C C C

D D D D D D C

C C D C C C D

D D D D D D C

D D D C D D D

C C D D D C C

When this orientation of the wall is heated, a space for new C wall of size 5x5 is created after the D bricks melt

_ _ _ _ _ _ _

_ _ _ _ _ _ _

_ _ _ _ _ _C

_ _ _ _ _ _ C

_ _ _ _ _ C C

C C _ C C C C

C C C C C C C

Whereas, if the rotation was not done, the wall formed after the D bricks melt will be as follows

_ _ _ _ _ _ _

_ _ _ _ _ _ _

_ _ _ C _ _ _

C _ _ C _ _ _

C _ _ C _ _ C

C _ _ C _ C C

C C C C C C C

When this orientation of the wall is heated, a space for new C wall of size 3x3 only is created after the D bricks melt

Hence rotation is important and correct answer is 5x5

Since no rotations followed by heating is going to a yield a space greater than 5x5, the output is 5.

Factor of 3

Problem Description

Given an array arr, of size N, find whether it is possible to rearrange the elements of array such that sum of no two adjacent elements is divisible by 3.

Constraints

1 <= T <= 10

2 <= N <= 10^5

1 <= arr[i] <= 10^5

Input

First line contains integer T denoting the number of testcases.

Each test cases consists of 2 lines as follows-

First line contains integer N denoting the size of the array.

Second line contains N space separated integers.

Output

For each test case print either "Yes" or "No" (without quotes) on new line.

Time Limit

1

Examples

Example 1

Input

1

4

1 2 3 3

Output

Yes

Explanation

Some of the rearrangements can be {2,1,3,3}, {3,3,1,2}, {2,3,3,1}, {1,3,3,2},...

We can see that there exist at least 1 combination {3,2,3,1} where sum of 2 adjacent number is not divisible by 3. Other combinations can be {1,3,2,3}, {2,3,1,3}.

Hence the output is Yes.

Example 2

Input

1

4

3 6 1 9

Output

No

Explanation

All possible combination of {3,6,1,9} are

{1,3,6,9}, {1,3,9,6}, {1,6,9,3}, {1,6,3,9}, {1,9,3,6}, {1,9,6,3},

{6,1,3,9}, {6,1, 9,3}, {6,3,1,9}, {6,3,9,1}, {6,9,1,3}, {6,9,3,1},

{3,1,6,9}, {3,1,9,6}, {3,9,1,6}, {3,9,6,1}, {3,6,1,9}, {3,6,9,1},

{9,1,3,6}, {9,1,6,3}, {9,3,1,6}, {9,3,6,1}, {9,6,1,3}, {9,6,3,1}.

Since none of these combinations satisfy the condition, the output is No.

Even Odd

Problem Description

Given a range [low, high] (both inclusive), select K numbers from the range (a number can be chosen multiple times) such that sum of those K numbers is even.

Calculate the number of all such permutations.

As this number can be large, print it modulo (1e9 +7).

Constraints

0 <= low <= high <= 10^9

K <= 10^6.

Input

First line contains two space separated integers denoting low and high respectively

Second line contains a single integer K.

Output

Print a single integer denoting the number of all such permutations

Time Limit

1

Examples

Example 1

Input

4 5

3

Output

4

Explanation

There are 4 valid permutations viz. {4, 4, 4}, {4, 5, 5}, {5, 4, 5} and {5, 5, 4} which sum up to an even number

Example 2

Input

1 10

2

Output

50

Explanation

There are 50 valid permutations viz. {1,1}, {1, 3},.. {1, 9} {2,2}, {2, 4},... {2, 10} . . . {10, 2}, {10, 4},... {10, 10}. These 50 permutations, each sum up to an even number.