

Topic : Simple math:

Min Digit

Tom and Jerry are playing a game with an integer N that doesn't contain any zeros in its decimal representation. Tom starts first and, on his turn, he can swap any two digits of the integer that are in different positions. Jerry follows by always removing the last digit of the integer. The game continues in turns until there's only one digit left. Determine the smallest integer Tom can achieve at the end if he plays optimally.

Input Format

The first and only line of input consists of an integer N consisting of digits 1 - 9.

Output Format

Print the smallest integer that Tom can achieve.

Constraints

$$10 < N < 10^9$$

Example

Input

132

Output

1

Explanation

Tom can swap 3 and 1, N becomes 312. After that Jerry deletes the last digit, N becomes 31. Then Tom swaps 3 and 1, N becomes 13 and Jerry deletes 3, so the answer is 1.

Harshad Numbers

Given an integer N , check whether it is a Harshad number or not.

Note that a Harshad number is an integer, that is divisible by the sum of its digits.

Input

The first and only line of input contains a integer - N .

Output

Print "Yes" if the number is Harshad number, "No" otherwise.

Constraints

$$1 \leq N \leq 10^9$$

Example

Input

18

Output

Yes

Explanation

$$18 / (1 + 8) = 2$$

As 18 is divisible by the sum of its digits, it is a Harshad number.

Minimum Subtraction

Given a number N, find a number X. On subtracting X from N, N-X should be a power of 2. Find the minimum value of X.

Input Format

First and only line of input contains an integer N.

Output Format

Print the value X.

Constraints

$$2 \leq N \leq 10^9$$

Example**Input**

10

Output

2

Explanation

N = 10

If we subtract X = 2 from N = 10, N - X = 8 is a power of 2.

Fuel Tank

A truck has two fuel tanks: a main tank and an additional tank. The fuel levels in both tanks are represented by two integers: mainTank, which represents the fuel in the main tank in litres, and additionalTank, which represents the fuel in the additional tank in litres.

The truck has a mileage of 10 kilometers per litre. Whenever 5 litres of fuel are consumed from the main tank, if the additional tank has at least 1 litre of fuel, 1 litre of fuel will be transferred from the additional tank to the main tank. Print the maximum distance that can be travelled with the given fuel.

Input Format

The first and only line of input contains two integers mainTank and additionalTank.

Output Format

Print the maximum distance that can be travelled with the given fuel.

Constraints

$1 \leq \text{mainTank}$, $\text{additionalTank} \leq 100$

Examples**Input 1**

5 10

Output 1

60

Input 2

2 2

Output 2

20

Explanation

Example 1:

After spending 5 litre of fuel, fuel remaining is $(5 - 5 + 1) = 1$ litre and the distance travelled is 50km.

After spending another 1 litre of fuel, no fuel gets injected in the main tank and the main tank becomes empty. Total distance travelled is 60km.

Example 2:

After spending 2 litre of fuel, the main tank becomes empty. Total distance traveled is 20km.

Narcissistic Numbers

Given an integer N, check whether it is a Narcissistic number or not.

Note that a Narcissistic number is a number that is the sum of its own digits each raised to the power of the number of digits

Input Format

The first and only line of input contains an integer - N.

Output Format

Print "Yes" if the number is a Narcissistic number, "No" otherwise.

Constraints

$0 \leq N \leq 10^9$

Example**Input**

8208

Output

Yes

Explanation

$8^4 + 2^4 + 0^4 + 8^4 = 8208$

Arrange Primes

Given an integer N. Print the count of permutations for the numbers from 1 to N, considering that prime numbers should be placed at positions with prime indices (1 - based indexing). As the result might be a large number, print the output % $1e9 + 7$.

Input Format

The first and only line of input contains an integer N.

Output Format

Print the count of permutations.

Constraints

$$1 \leq N \leq 100$$

Example

Input

8

Output

576

Explanation

Self Explanatory

Count Primes

Given an integer n, return the number of prime numbers that are strictly less than n.

Example 1:

Input: n = 10

Output: 4

Explanation: There are 4 prime numbers less than 10, they are 2, 3, 5, 7.

Example 2:

Input: n = 0

Output: 0

Example 3:

Input: n = 1

Output: 0

Constraints:

- $0 \leq n \leq 5 * 10^6$

Ugly Number

An ugly number is a positive integer whose prime factors are limited to 2, 3, and 5.
Given an integer n, return true if n is an ugly number.

Example 1:

Input: n = 6

Output: true

Explanation: $6 = 2 \times 3$

Example 2:

Input: n = 1

Output: true

Explanation: 1 has no prime factors, therefore all of its prime factors are limited to 2, 3, and 5.

Example 3:

Input: n = 14

Output: false

Explanation: 14 is not ugly since it includes the prime factor 7.

Constraints:

- $-2^{31} \leq n \leq 2^{31} - 1$

Topic : Patterns :

Floyd Pattern - 1

Print a right-angled triangle pattern using integers. See the example for more details.

Input Format

The first and only line of input contains a single integer N - the size of the triangle.

Output Format

For the given integer, print the right-angled triangle pattern.

Constraints

$1 \leq N \leq 50$

Example

Input

6

Output

1

2 3

4 5 6

7 8 9 10

11 12 13 14 15

16 17 18 19 20 21

Explanation

Self Explanatory

Print Hollow Diamond Pattern

Print hollow diamond pattern using '*'. See examples for more details.

Input Format

First line of input contains T - number of test cases. Its followed by T lines, each line contains a single odd integer N - the size of the diamond.

Constraints

$1 \leq T \leq 100$

$3 \leq N \leq 201$

Output Format

For each test case, print the test case number as shown, followed by the diamond pattern, separated by newline.

Sample Input 0

4

3

7

5

15

Sample Output 0

Case #1:

*

* *

*

Case #2:

*

```

* *
* *
* *
* *
* *
*

```

Case #3:

```

*
* *
* *
* *
*

```

Case #4:

```

*
* *
* *
* *
* *
* *
* *
* *
* *
* *
* *
* *
* *
* *
*

```

Explanation 0
Self Explanatory

Pascal's Triangle

Given a value N, print the Pascal's Triangle pattern.

Input Format

The first and only line of input contains an integer N.

Output Format

For the given input, print the Pascal's Triangle pattern.

Constraints

$1 \leq N \leq 30$

Example

Input

10

Output

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

1 5 10 10 5 1

1 6 15 20 15 6 1

1 7 21 35 35 21 7 1

1 8 28 56 70 56 28 8 1

1 9 36 84 126 126 84 36 9 1

Explanation

Self Explanatory

Topic : Arrays :

Max Element in Array

Find the maximum element from the given array of integers.

Input Format

The first line of input contains N - the size of the array and the second line contains the elements of the array.

Output Format

Print the maximum element of the given array.

Constraints

$1 \leq N \leq 10^3$

$-10^9 \leq \text{ar}[i] \leq 10^9$

Example**Input**

5

-2 -19 8 15 4

Output

15

Explanation

Self Explanatory

Number Distribution

Print the count of the occurrences of positive integers, negative integers, and zeroes in the given array.

Input Format

The first line of the input contains an integer N - size of the array, the second line of input contains an array of elements of the array.

Output Format

Print the frequencies of zeroes, positive elements and negative elements.

Constraints

$$1 \leq N \leq 10^4$$

$$-10^3 \leq \text{arr}[i] \leq 10^3$$

Example

Input

```
10
120 0 -9 89 68 -982 91 -54 -12 -139
```

Output

```
1 4 5
```

Explanation

Self Explanatory

Max Altitude

Imagine a pilot starting the flight from the ground and flying over a series of different points at different heights. You are given an array, where $A[i]$ represents heights.

Currently, if the pilot is at altitude X at i th point, and if he wants to reach $(i+1)^{\text{th}}$ point, his altitude will become $X+A[i]$.

The pilot starts at altitude 0 and wants to find the highest point he can reach during the entire journey. Your task is to print the highest altitude the pilot reaches.

Input Format

The first line of input contains an integer N . The second line of input contains N space-separated integers.

Output Format

Print the highest altitude the pilot can reach.

Constraints

$$1 \leq N \leq 1000$$

$$-1000 \leq A[i] \leq 1000$$

Example**Input**

5
-5 1 5 0 -7

Output

1

Explanation

When the pilot started at point 0 his altitude was -5, when he moved to point 1 his altitude became $(-5 + 1 = -4)$, at point 2 his altitude became $(-4 + 5 = 1)$, at point 3 his altitude remains $(1 + 0 = 1)$, and at point 4 his altitude became $(1 + -7 = -6)$. The maximum altitude that he reached in his journey was 1.

Reverse Array

Print the array in reverse order.

Note:

Try solving this using recursion. Do not use any inbuilt functions / libraries for your main logic.

Input Format

The first line of input contains N - the size of the array and the second line contains the elements of the array.

Output Format

Print the given array in reverse order.

Constraints

$1 \leq N \leq 100$

$0 \leq \text{ar}[i] \leq 1000$

Example**Input**

5
2 19 8 15 4

Output

4 15 8 19 2

Explanation

Self Explanatory

Odd and Even Sum

Given an array of size N. Print the sum of odd and even numbers separated by a space.

Input Format

The first line of input contains N - the size of the array and the second line contains elements of the array.

Output Format

Print the sum of odd elements followed by the sum of even elements.

Constraints

$1 \leq N \leq 10^3$

$1 \leq \text{ar}[i] \leq 10^6$

Example

Input

5
4 6 9 2 5

Output

14 12

Explanation

Self Explanatory

Left Sum and Right Sum

Given an array A of size N. Construct an array B, such that B[i] is calculated as follows:

- Find leftSum => sum of elements to the left of index i in array A; if none, use 0.
- Find rightSum => sum of elements to the right of index i in array A; if none, use 0.
- $B[i] = | \text{leftSum} - \text{rightSum} |$

Your task is to simply print the B array.

Input Format

The first line of input contains the N - size of the array. The next line contains N integers - the elements of array A.

Output Format

Print the elements of the B array separated by space.

Constraints

$1 \leq N \leq 100$
 $0 \leq \text{arr}[i] \leq 100000$

Example

Input

3
6 7 7

Output

14 1 13

Explanation

At index 0:

LeftSum = 0, RightSum = 14

$B[0] = | \text{LeftSum} - \text{RightSum} | = 14.$

At index 1:

LeftSum = 6, RightSum = 7

$B[1] = | \text{LeftSum} - \text{RightSum} | = 1.$

At index 2:

LeftSum = 13, RightSum = 0

$B[2] = | \text{LeftSum} - \text{RightSum} | = 13.$

Mean Median Mode

Given a sorted array A, containing N integers. Calculate and print their Mean, Median and Mode.

1. For both the Mean and Median, display the values with precision up to two decimal places.
2. Print the first Mode that you encounter from the left hand side.

Input Format

First line of input contains integer N - the size of the array. Second line of input contains N integers - elements of the array A.

Output Format

Print Mean, Median and Mode, separated by spaces.

Constraints

$$3 \leq N \leq 10^5$$

$$1 \leq A[i] \leq 10^5$$

Example

Input

```
8
1 2 3 4 5 5 6 6
```

Output

```
4.00 4.50 5
```

Explanation:

The Mean is $32 / 8 = 4.00$ [rounded to 2 decimals]

The Median is $(4+5) / 2 = 4.50$

For the given example, {5, 6} represents the Mode of the array, we'll print 5 as it's the first Mode encountered.

Finding Missing Number

Given an array of size N, it contains all the numbers from 1 to N+1 inclusive, except one number. You have to find the missing number.

Input Format

First line of input contains T - number of test cases. Its followed by 2T lines, first line of each test case contains N - size of the array and the next line contains N integers - the elements of the array.

Constraints

$$1 \leq T \leq 500$$

$$1 \leq N \leq 10000$$

$$1 \leq ar[i] \leq N+1$$

Output Format

For each test case, print the missing number, separated by newline.

Sample Input 0

```
3
8
```

1 2 7 9 5 6 3 8
7
3 5 8 1 4 7 2
10
8 11 10 2 7 4 3 5 1 6

Sample Output 0

4
6
9

Explanation 0

Test Case 1:

Array Size=8: It should have all the elements between [1,9] exactly once, except one of them.
Hence 4 is the missing element.

Test Case 2:

Array Size=7: It should have all the elements between [1,8] exactly once, except one of them.
Hence 6 is the missing element.

Find Duplicate Number in Array

Find a duplicate element in the given array of integers. There will be only a single duplicate element in the array.

Note:

Do not use any inbuilt functions / libraries for your main logic

Input Format

The first line of input contains the size of the array - N and the second line contains the elements of the array, there will be only a single duplicate element in the array.

Output Format

Print the duplicate element from the given array.

Constraints

$2 \leq N \leq 100$

$0 \leq \text{ar}[i] \leq 10^9$

Example

Input

6
5 4 10 9 21 10

Output

10

Explanation

Self Explanatory

Count Set Bits

Given a number N, find the number of bits that are set to 1 in its binary representation.

Input Format

First line of input contains T - the number of test cases. It is followed by T lines, each line containing a single integer N.

Constraints

$1 \leq T \leq 104$

$0 \leq N \leq 1018$

Output Format

For each test case, print the number of bits set to 1 in the binary representation of N, separated by a new line.

Sample Input 0

```
3
4
15
10
```

Sample Output 0

```
1
4
2
```

Explanation 0

Test-Case 1:

The binary representation of 4 is 100. The number of 1's in the binary representation of 4 is 1.

Test-Case 2:

The binary representation of 15 is 1111. The number of 1's in the binary representation of 15 is 4.

Gauntlets

You have a collection of N gauntlets, each with a specific color represented by $A[i]$. Your goal is to maximize the number of pairs by repeatedly pairing up gauntlets of the same color. Determine the maximum number of pairs that can be formed.

Input Format

The first line of input contains an integer N. The second line of input contains an array of size N.

Output Format

For the given input, print a single line representing the answer.

Constraints

$1 \leq N \leq 10^2$

$1 \leq A_i \leq 10^3$

Example

Input

6

4 1 7 4 1 4

Output

2

Explanation

You can do the operation twice as follows.

- Choose two gauntlets with the color 1 and pair them.
- Choose two gauntlets with the color 4 and pair them.

Then, you will be left with one sock with the color 4 and another with the color 7, so you can no longer do the operation. There is no way to do the operation three or more times, so you should print 2.

First and Last

You are given an array A of size N, containing integers. Your task is to find the first and last occurrences of a given element X in the array A and print them.

Input Format

The input consists of three lines. The first line contains a single integer N - the size of the array. The second line contains N integers separated by a space, representing the elements of the array A. The third line contains a single integer X.

Output Format

Print the indexes of the first and last occurrences separated by a space.

Constraints

$1 \leq N \leq 10^3$

$1 \leq A[i] \leq 10^5$

$X \in A$

Example**Input**

10

1 3 5 7 9 11 3 13 15 3

3

Output

1 9

Explanation

Self Explanatory

Unique Elements

Print unique elements of the array in the same order as they appear in the input.

Note:

Do not use any inbuilt functions / libraries for your main logic.

Input Format

The first line of input contains the size of the array - N and the second line contains the elements of the array.

Output Format

Print unique elements from the given array.

Constraints

$1 \leq N \leq 100$

$0 \leq \text{ar}[i] \leq 10^9$

Example

Input

7

5 4 10 9 21 4 10

Output

5 9 21

Explanation

Self Explanatory

Flip Bits

You are given two numbers A and B. Write a program to count the number of bits to be flipped to change the number A to the number B. Flipping a bit of a number means changing a bit from 1 to 0 or vice versa.

Input Format

First line of input contains T - number of test cases. Each of the next T lines contains 2 integer A and B, separated by space.

Constraints

$1 \leq T \leq 100000$

$0 \leq N \leq 10^9$

Output Format

For each test case, print the number of bit flips required to convert A to B, separated by new line.

Sample Input 0

4

20 10

16 8

1 153

549 24

Sample Output 0

4

2

3

Explanation 0
Self Explanatory

Merge Two Sorted Arrays

You are given two sorted integer arrays A and B of size N and M respectively. Print the entire data in sorted order.

Input Format

First line of input contains N - the size of the array. The second line contains N integers - the elements of the first array. The third line contains M - the size of the second array. The fourth line contains M integers - the elements of the second array.

Output Format

For each test case, print the entire data in sorted order with each element separated by a space, on a new line.

Constraints

$$1 \leq N \leq 10^3$$

$$1 \leq M \leq 10^3$$

$$-10^5 \leq A[i], B[i] \leq 10^5$$

Example

Input

7

1 1 5 8 10 12 15

5

-1 2 4 5 7

Output

-1 1 1 2 4 5 5 7 8 10 12 15

Explanation

Self Explanatory

Interchange Diagonals

Given a matrix A of size NxN, interchange the diagonal elements from top to bottom and print the resultant matrix.

Input Format

First line of input contains N - the size of the matrix. It is followed by N lines each containing N integers - elements of the matrix.

Output Format

Print the matrix after interchanging the diagonals.

Constraints

$$1 \leq N \leq 100$$

$$1 \leq A[i][j] \leq 10^4$$

Example**Input**

```
4
5 6 7 8
13 14 15 16
1 2 3 4
9 10 11 12
```

Output

```
8 6 7 5
13 15 14 16
1 3 2 4
12 10 11 9
```

Explanation

Self Explanatory

Print Array A Using B

Given two arrays, A and B, for each index 'i' in array B, print the corresponding element from array A if B[i] is within the range of A, otherwise print -1.

Input Format

The first line of input contains an integer N - size of array A. The Second line of input contains elements of array A. The Third line of input contains an integer M - size of array B. The Fourth line of input contains elements of array B.

Output Format

Print the values of array A for every index 'i' in B i.e. A[B[i]] if B[i] is in the range, otherwise print -1.

Constraints

```
1 <= N <= 100
1 <= A[k] <= 1000
1 <= M <= 100
0 <= B[i] <= 1000
```

Example**Input**

```
5
100 200 400 800 1000
6
4 2 0 6 10 0
```

Output

```
1000 400 100 -1 -1 100
```

Explanation

B[0] is 4, A[B[0]] => A[4] = 1000

B[1] is 2, A[B[1]] => A[2] = 400

B[2] is 0, A[B[2]] => A[0] = 100

B[3] is 6, size of array A is 5, any index >= 5 is an invalid index, so print -1.

B[4] is 10, size of array A is 5, any index >= 5 is an invalid index, so print -1.

$B[5]$ is 0, $A[B[5]] \Rightarrow A[0] = 100$

Repeated Numbers

You are given an array of N elements. All elements of the array are in range 1 to $N-2$. All elements occur once except two numbers, which occur twice. Your task is to find the two repeating numbers.

Input Format

First line of input contains T - number of test cases. Its followed by $2T$ lines, the first line contains N - the size of the array and second line contains the elements of the array.

Constraints

30 points

$1 \leq T \leq 100$

$4 \leq N \leq 103$

70 points

$1 \leq T \leq 100$

$4 \leq N \leq 106$

Output Format

Print the 2 repeated numbers in sorted manner, for each test case, separated by new line.

Sample Input 0

2

8

1 3 2 3 4 6 5 5

10

1 5 2 8 1 4 7 4 3 6

Sample Output 0

3 5

1 4

Explanation 0

Self Explanatory

Max Min Partition

Given an array D of positive integers, your goal is to divide D into two separate arrays, E and F , under the following conditions:

- Each element in array D must belong to either array E or array F
- Both arrays E and F are non-empty
- The objective is to minimize the partition's value, calculated as the absolute difference between the maximum value of array E (denoted as $\max(E)$) and the minimum value of array F (denoted as $\min(F)$)

Print the resulting integer that represents the value of this partition.

Input Format

The first line of input contains N. The second line of input contains an array of size N.

Output Format

Print the minimized partition value.

Constraints

$$2 \leq N \leq 10^4$$

$$1 \leq D_i \leq 10^9$$

Example**Input**

6
7 1 14 16 30 4

Output

2

Explanation

We can partition the array D into $E = [7, 1, 14, 4]$ and $F = [16, 30]$.

- The maximum element of the array E is equal to 14.
- The minimum element of the array F is equal to 16.

The value of the partition is $|14 - 16| = 2$. It can be proven that 2 is the minimum value out of all the partitions.

Non Divisible Subsets

Given an array of N unique numbers, find the maximum length subset that can be formed such that sum of any 2 numbers in the subset is not a multiple of K.

Input Format

First line of input contains T - number of test cases. Its followed by 2T lines, the first line contains 2 numbers N and K. Second line contains the elements of the array.

Constraints

10 points

$$1 \leq T \leq 100$$

$$1 \leq N \leq 10$$

$$1 \leq K \leq 50$$

$$0 \leq \text{arr}[i] \leq 10^2$$

30 points

$$1 \leq T \leq 100$$

$$1 \leq N \leq 10^2$$

$$1 \leq K \leq 10^2$$

$$0 \leq \text{arr}[i] \leq 10^5$$

60 points

$$1 \leq T \leq 100$$

$1 \leq N \leq 104$
 $1 \leq K \leq 105$
 $0 \leq \text{arr}[i] \leq 105$

Output Format

For each test case, print the maximum length of the subset, separated by new line.

Sample Input 0

1
4 3
1 7 2 4

Sample Output 0

3

Explanation 0

Self Explanatory

Product Manufacturing

There are M manufacturers and each of them produce a range of products.

M1: [a1, b1]

M2: [a2, b2]

and so on...

Given a product ID, find how many manufacturers produce the given product.

Input Format

First line of input contains T - number of test cases. The first line of each test case contains an integer M. Next M lines contains the ith manufacturer's range of product ids - starting(S) and ending(E) (both inclusive). The next line contains Q - number of queries and the next Q lines contains a single integer denoting the ID of the product.

Constraints

20 points

$1 \leq T \leq 100$
 $1 \leq M, Q \leq 1000$
 $1 \leq S \leq E \leq 104$
 $1 \leq ID \leq 104$

30 points

$1 \leq T \leq 100$
 $1 \leq M, Q \leq 10000$
 $1 \leq S \leq E \leq 104$
 $1 \leq ID \leq 104$

50 points

$1 \leq T \leq 100$
 $1 \leq M, Q \leq 10000$
 $1 \leq S \leq E \leq 109$
 $1 \leq ID \leq 109$

Output Format

For each test case, print the number of merchants producing the given product for each query, separated by newline.

Sample Input 0

```
1
4
1 3
1 6
3 5
5 9
4
3
8
6
10
```

Sample Output 0

```
3
1
2
0
```

Explanation 0

Self Explanatory

Longest Contiguous 1's

Given an array of elements containing 0's and 1's. You have to find the length of longest contiguous 1's.

Input Format

First line of input contains N - size of the array. The next line contains the N integers of array A.

Output Format

Print the length of longest contiguous 1's.

Constraints

$1 \leq N \leq 1000$

Example

Input

```
10
1 0 0 1 0 1 1 1 1 0
```

Output

```
4
```

Explanation

Self Explanatory

Non Decreasing Subsequences

You are given an array of integers of size N. Find the total number of non-decreasing subsequences present in the array.

Input Format

First line of input contains T - number of test cases. Its followed by 2T lines, the first line contains N - the size of the array. The second line contains the elements of the array.

Constraints

30 points

$1 \leq T \leq 100$

$1 \leq N \leq 20$

$-105 \leq A[i] \leq 105$

70 points

$1 \leq T \leq 100$

$1 \leq N \leq 103$

$-105 \leq A[i] \leq 105$

Output Format

For each test case, print the total number of non decreasing subsequences present in the array, on a new line.

Since this number can be very large, print the result % 1000000007.

Sample Input 0

```
2
4
1 8 2 5
10
9 7 8 6 5 7 4 3 2 1
```

Sample Output 0

```
9
14
```

Explanation 0

Test-Case 1

The are 9 non decreasing subsequences:

{1}, {8}, {2}, {5}, {1,8}, {1,2}, {1,5}, {2,5} and {1,2,5}.

Test-Case 2

The are 14 non decreasing subsequences:

{9}, {7}, {8}, {6}, {5}, {7}, {4}, {3}, {2}, {1}, {7,8}, {7,7}, {6,7} and {5,7}.

Count the Triangles

You have a collection of N rods. Each rod has a unique mark on it. You are given the lengths of each rod. You have to tell how many different triangles can be formed using these rods.

Input Format

First line of input contains T - number of test cases. Its followed by $2T$ lines, the first line contains N - the number of rods. The second line contains the lengths of the rods.

Constraints

30 points

$1 \leq T \leq 100$

$1 \leq N \leq 100$

$1 \leq A[i] \leq 100000$

70 points

$1 \leq T \leq 100$

$1 \leq N \leq 1000$

$1 \leq A[i] \leq 100000$

Output Format

For each test case, print the total number of different triangles possible, separated by new line.

Sample Input 0

```
2
6
20 67 72 83 23 59
6
4 2 10 12 8 10
```

Sample Output 0

```
14
10
```

Explanation 0

Self Explanatory

Finding the Floor

Given an array, you have to find the floor of a number x . The floor of a number x is nothing but the largest number in the array less than or equal to x .

Input Format

First line of input contains N - size of the array. The next line contains N integers, the elements of the array. The next line contains Q - number of queries. Each of the next Q lines contains a single integer X , for which you have to find the floor of X in the given array.

Constraints

30 points

$1 \leq N \leq 105$

1 <= Q <= 102

-108 <= ar[i] <= 108

70 points

1 <= N <= 105

1 <= Q <= 105

-108 <= ar[i] <= 108

Output Format

For each query, print the floor of X, separated by newline. If floor not found, print the value of "INT_MIN"

Sample Input 0

6

-6 10 -1 20 15 5

5

-1

10

8

-10

-4

Sample Output 0

-1

10

5

-2147483648

-6

Explanation 0

Self Explanatory

Finding Frequency

Given an array, you have to find the frequency of a number x.

Input Format

First line of input contains N - size of the array. The next line contains N integers, the elements of the array. The next line contains Q - number of queries. Each of the next Q lines contains a single integer X, for which you have to find the frequency of X in the given array.

Constraints

30 points

1 <= N <= 105

1 <= Q <= 102

-108 <= ar[i] <= 108

70 points

1 <= N <= 105

$1 \leq Q \leq 105$

$-108 \leq ar[i] \leq 108$

Output Format

For each query, print the frequency of X, separated by newline.

Sample Input 0

9

-6 10 -1 20 -1 15 5 -1 15

5

-1

10

8

15

20

Sample Output 0

3

1

0

2

1

Explanation 0

Self Explanatory

Frequency Sort

You are given an array of integers. Sort them by frequency. See examples for more clarifications.

Input Format

First line of input contains T - number of test cases. Its followed by 2T lines, the first line contains N - the size of the array. The second line contains the elements of the array.

Constraints

$1 \leq T \leq 100$

$1 \leq N \leq 10000$

$-1000 \leq A[i] \leq 1000$

Output Format

For each test case, print the elements of the array sorted by frequency. In case 2 elements have the same frequency, print the smaller element first.

Sample Input 0

2

6

4 -2 10 12 -8 4

8

176 -272 -272 -45 269 -327 -945 176

Sample Output 0

-8 -2 10 12 4 4

-945 -327 -45 269 -272 -272 176 176

Explanation 0

Self Explanatory

Sum of Pairs

Given an array of integers and a number K , check if there exist a pair of indices i, j s.t. $a[i] + a[j] = K$ and $i \neq j$.

Input Format

First line of input contains T - number of test cases. Its followed by $2T$ lines, first line of each test case contains N - size of the array and K , and the next line contains N integers - the elements of the array.

Constraints

30 points

$1 \leq T \leq 100$

$2 \leq N \leq 1000$

70 points

$1 \leq T \leq 300$

$2 \leq N \leq 10000$

General Constraints

$-108 \leq K \leq 108$

$-108 \leq a[i] \leq 108$

Output Format

For each test case, print "True" if such a pair exists, "False" otherwise, separated by newline.

Sample Input 0

3

5 -15

-30 15 20 10 -10

2 20

10 10

4 7

-4 0 10 -7

Sample Output 0

True

True

False

Explanation 0
Self Explanatory

Pair with Difference K

You are given an integer array and a positive integer K. You have to tell if there exists a pair of integers in the given array such that $ar[i]-ar[j]=K$ and $i \neq j$.

Input Format

First line of input contains T - number of test cases. Its followed by 2T lines, the first line contains N and K - the size of the array and the number K. The second line contains the elements of the array.

Constraints

40 points

$2 \leq N \leq 1000$

60 points

$2 \leq N \leq 100000$

General Constraints

$1 \leq T \leq 100$

$-105 \leq ar[i], K \leq 105$

Output Format

For each test case, print "true" if the arrays contains such elements, false otherwise, separated by new line.

Sample Input 0

```
2
5 60
1 20 40 100 80
10 11
12 45 52 65 21 645 234 14 575 112
```

Sample Output 0

```
true
false
```

Explanation 0
Self Explanatory

Triplet with Sum K

You are given an integer array and a number K. You have to tell if there exists i,j,k in the given array such that $ar[i]+ar[j]+ar[k]=K$, $i \neq j \neq k$.

Input Format

First line of input contains T - number of test cases. Its followed by 2T lines, the first line contains N and K - the size of the array and the number K. The second line contains the elements of the array.

Constraints

30 points

$1 \leq T \leq 100$

$3 \leq N \leq 100$

70 points

$1 \leq T \leq 100$

$3 \leq N \leq 1000$

General

$-100000 \leq A[i] \leq 100000$

$0 \leq K \leq 100000$

Output Format

For each test case, print "true" if the arrays contains such elements, false otherwise, separated by new line.

Sample Input 0

3

5 60

1 20 40 100 80

12 54

12 45 52 65 21 645 234 -100 14 575 -80 112

3 15

5 5 5

Sample Output 0

false

true

true

Explanation 0

Self Explanatory

Topic : Matrix

Image Flip

You are given an N x M binary matrix called "image". You need to perform the following operations on the matrix (in order) and return the resulting image:

1. Flip the image horizontally: This involves reversing the order of elements in each row of the matrix. For example, [1,0,1,0,0,0] becomes [0,0,0,1,0,1]
2. Invert the image: This involves replacing 0s with 1s and 1s with 0s in the entire matrix. For example, [0,0,0,1,0,1] becomes [1,1,1,0,1,0]

Input Format

Line of input contains N - number of rows and M - number of columns. The next N lines contains M integers each denoting the elements of the matrix image.

Output Format

You have to print the resultant matrix image.

Constraints

$1 \leq N \leq 100$

$1 \leq M \leq 100$

Example

Input

2 2

1 0

0 1

Output

1 0

0 1

Explanation

Self Explanatory

Rotation of Matrix

Given a 2D square matrix, rotate the matrix by 90 degrees in a clockwise manner.

Note: Try to solve it by first scanning the matrix, then do an in-place rotation and then print the rotated matrix.

Input Format

First line of input contains T - number of test cases. First line of each test case contains N - size of the matrix [N×N]. Its followed by N lines each containing N integers - elements of the matrix.

Constraints

$1 \leq T \leq 100$

$1 \leq N \leq 100$

$-100 \leq ar[i][j] \leq 100$

Output Format

For each test case, print the rotated matrix, separated by newline.

Sample Input 0

4

1

1

2

```
1 2
4 3
3
1 2 3
8 9 4
7 6 5
5
-44 25 -52 69 -5
17 22 51 27 -44
-79 28 -78 1 -47
65 -77 -14 -21 -6
-96 43 -21 -20 90
```

Sample Output 0

Test Case #1:

1

Test Case #2:

4 1

3 2

Test Case #3:

7 8 1

6 9 2

5 4 3

Test Case #4:

-96 65 -79 17 -44

43 -77 28 22 25

-21 -14 -78 51 -52

-20 -21 1 27 69

90 -6 -47 -44 -5

Explanation 0

Self Explanatory

Local Max in Matrix

Given an integer matrix C with dimensions $N \times N$. Construct a new integer matrix D of size $(N - 2) \times (N - 2)$ such that each element $D[i][j]$ represents the maximum value within a 3×3 submatrix of C , where the center of the submatrix is located at row $i + 1$ and column $j + 1$ in matrix C . We aim to identify the highest value within every continuous 3×3 submatrix within C . Print the resulting matrix D .

Input Format

The first line of input contains an integer N . For the next N lines, each line contains N elements separated by space.

Output Format

Print the generated matrix.

Constraints

$$3 \leq n \leq 100$$

$$-1000 \leq C_{ij} \leq 1000$$

Example**Input**

```
4
12 9 8 40
5 20 2 6
8 14 6 30
6 2 25 2
```

Output

```
20 40
25 30
```

Explanation

Self Explanatory

The Hourglass sum:

Given a 2D Array, :

```
1 1 1 0 0 0
0 1 0 0 0 0
1 1 1 0 0 0
0 0 0 0 0 0
0 0 0 0 0 0
0 0 0 0 0 0
```

An hourglass in is a subset of values with indices falling in this pattern in 's graphical representation:

```
a b c
  d
e f g
```

There are hourglasses in . An hourglass sum is the sum of an hourglass' values. Calculate the hourglass sum for every hourglass in , then print the maximum hourglass sum. The array will always be .

Example

```
-9 -9 -9 1 1 1
0 -9 0 4 3 2
-9 -9 -9 1 2 3
0 0 8 6 6 0
0 0 0 -2 0 0
0 0 1 2 4 0
```


The hourglass sums are:

-63, -34, -9, 12,
-10, 0, 28, 23,
-27, -11, -2, 10,
9, 17, 25, 18

The highest hourglass sum is from the hourglass beginning at row , column :

0 4 3
1
8 6 6

hourglassSum has the following parameter(s):

- int arr[6][6]: an array of integers

Returns

- int: the maximum hourglass sum

Input Format

Each of the lines of inputs contains space-separated integers .

Constraints

- $-9 \leq a[i][j] \leq 9$
- $0 \leq i, j \leq 5$

Output Format

Print the largest (maximum) hourglass sum found in .

Sample Input

1 1 1 0 0 0
0 1 0 0 0 0
1 1 1 0 0 0
0 0 2 4 4 0
0 0 0 2 0 0
0 0 1 2 4 0

Sample Output

19

Explanation

contains the following hourglasses:

1	1	1	1	1	0	1	0	0	0	0	0
	1			0			0			0	
1	1	1	1	1	0	1	0	0	0	0	0
0	1	0	1	0	0	0	0	0	0	0	0
	1			1			0			0	
0	0	2	0	2	4	2	4	4	4	4	0
1	1	1	1	1	0	1	0	0	0	0	0
	0			2			4			4	
0	0	0	0	0	2	0	2	0	2	0	0
0	0	2	0	2	4	2	4	4	4	4	0
	0			0			2			0	
0	0	1	0	1	2	1	2	4	2	4	0

The hourglass with the maximum sum () is:

2 4 4

2

1 2 4

Zero Row and Zero Column

Given a matrix A of size N x M. Elements of the matrix are either 0 or 1. If $A[i][j] = 0$, set all the elements in the i^{th} row and j^{th} column to 0. Print the resultant matrix.

Input Format

The first line of input contains N, M - the size of the matrix A. It is followed by N lines each containing M integers - elements of the matrix.

Output Format

Print the resultant matrix.

Constraints

$1 \leq N, M \leq 100$

$A[i][j] \in \{0, 1\}$

Example

Input

```
4 5
0 1 1 0 1
1 1 1 1 1
1 1 0 1 1
1 1 1 1 1
```

Output

```
0 0 0 0 0
0 1 0 0 1
0 0 0 0 0
```

0 1 0 0 1

Explanation

Self Explanatory

Smart Square

Consider matrix of size 3×3 . A matrix is said to be a smart matrix, if it consists of distinct numbers from 1 to 9 and the sum of every row, column and diagonal is divisible by 5. Given a matrix, find the minimum cost of converting it to a smart matrix by changing zero or more of its digits. We can convert any digit a to b in the range of $[1,9]$ at cost $|a-b|$.

Input Format

First line of input contains T - number of test cases. Its followed by $3T$ lines. Each test case contains a 3×3 matrix with distinct numbers from 1 to 9.

Constraints

$1 \leq T \leq 105$

Output Format

For each test case, print the minimum cost to convert the matrix into a smart one, separated by newline.

Sample Input 0

```
3
4 9 2
3 5 7
6 8 1
8 6 1
3 5 2
4 9 7
1 4 6
3 5 9
2 7 6
```

Sample Output 0

```
4
0
10
```

Explanation 0

Test Case 1

We can convert the given matrix to the following smart matrix which gives a minimum cost of 4.

```
4 9 2
3 5 7
8 6 1
```

Test Case 2

The given matrix is already a smart matrix.

Test Case 3

We can convert the given matrix to the following smart matrix which gives a minimum cost of 10.

1 2 7

6 5 9

3 8 4

Right Triangles

You are given a 2D boolean matrix grid.

Return an integer that is the number of right triangles that can be made with the 3 elements of grid such that all of them have a value of 1.

Note:

- A collection of 3 elements of grid is a right triangle if one of its elements is in the same row with another element and in the same column with the third element. The 3 elements do not have to be next to each other.

Example 1:

0	1	0
0	1	1
0	1	0

0	1	0
0	1	1
0	1	0

Input: grid = [[0,1,0],[0,1,1],[0,1,0]]

Output: 2

Explanation:

There are two right triangles.

Example 2:

1	0	0	0
0	1	0	1
1	0	0	0

Input: grid = [[1,0,0,0],[0,1,0,1],[1,0,0,0]]

Output: 0

Explanation:

There are no right triangles.

Example 3:

1	0	1
1	0	0
1	0	0

1	0	1
1	0	0
1	0	0

Input: grid = [[1,0,1],[1,0,0],[1,0,0]]

Output: 2

Explanation:

There are two right triangles.

Constraints:

- $1 \leq \text{grid.length} \leq 1000$
- $1 \leq \text{grid}[i].\text{length} \leq 1000$
- $0 \leq \text{grid}[i][j] \leq 1$

Topic : Strings:

Letter Coverage

Given a string, check if it contains all the letters of the alphabet.

Input Format

Input contains a string S, consisting of lowercase and uppercase characters.

Output Format

Print "Yes" if the string contains all the letters of the alphabet, and "No" otherwise.

Constraints

$1 \leq \text{len}(S) \leq 100$

Example

Input

askhtwsflkqwertyuioPasdfghjklZxcvbnm

Output

Yes

Explanation

Self Explanatory

String GCD

Given two strings, P and Q, your task is to find the largest common divisor string S, such that both P and Q are divisible by S. In other words, there exists a string 'S' for which $P = S + S + \dots + S$ and $Q = S + S + \dots + S$. If such a string S exists, output the largest possible S, otherwise, print -1.

Note: A string X is divisible by string Y if and only if X can be obtained by concatenating Y with itself one or more times.

Input Format

The first line of input contains the string P. The Second line of input contains string Q.

Output Format

Print the largest string S.

Constraints

$1 \leq \text{len}(P), \text{len}(Q) \leq 1000$

'A' <= P[i], Q[i] <= 'Z'

Example

Input

ABABAB

ABAB

Output

AB

Explanation

Self Explanatory

Anagram Basic

Given two strings A and B consisting of lowercase characters. Print TRUE if A and B are anagrams otherwise FALSE.

Input Format

The first line of input contains string A. The second line of input contains string B.

Output Format

Print "TRUE" if A and B are anagrams otherwise "FALSE".

Constraints

$1 \leq \text{len}(A), \text{len}(B) \leq 10^4$

Example

Input

smartinterviews

viewsintersmart

Output

TRUE

Explanation

Self Explanatory

Strings Rotation

Given two strings A and B of length N, check if string A is a rotation of string B.

Input Format

The first line of input contains N - the length of the strings. The second line contains A and B separated by a space.

Output Format

Print "yes" if A is a rotation of B, otherwise "no".

Constraints

$1 \leq N \leq 500$

'a' \leq A[i], B[i] \leq 'z'

Example**Input**

5

hello lohel

Output

yes

Explanation

Self Explanatory

Next Palindromic Number

Given a number N, find the least palindromic number K, such that $K > N$.

Input Format

First line of input contains T - number of test cases. Its followed by T lines, each contains a single number N.

Constraints

30 points

$1 \leq T \leq 104$

$1 \leq N \leq 104$

70 points

$1 \leq T \leq 105$

$1 \leq N \leq 109$

Output Format

For each test case, print the least palindromic number K, such that $K > N$, separated by newline.

Sample Input 0

2

11

121

Sample Output 0

22

131

Explanation 0

Self Explanatory

Longest Common Prefix

Write a function to find the longest common prefix string amongst an array of strings.
If there is no common prefix, return an empty string "".

Example 1:

Input: strs = ["flower", "flow", "flight"]

Output: "fl"

Example 2:

Input: strs = ["dog", "racecar", "car"]

Output: ""

Explanation: There is no common prefix among the input strings.

Constraints:

- $1 \leq \text{strs.length} \leq 200$
- $0 \leq \text{strs}[i].\text{length} \leq 200$
- `strs[i]` consists of only lowercase English letters.

Strong Password

Find the minimum number of characters to add to a password (P) to ensure that P meets the following criteria:

1. Contains at least 6 characters.
2. Contains at least one digit.
3. Contains at least one lowercase character.
4. Contains at least one uppercase character.
5. Contains at least one special character (!@#\$%^&*()-+).

Input Format

First and only line of input contains a string P.

Output Format

Print the minimum number of characters that has to be added to P.

Constraints

$1 \leq \text{len}(P) \leq 50$

$P[i] \in \{[a-z], [A-Z], [0-9], \text{ or } [!@*\$ \% \wedge \& * () - +]\}$.

Example

Input

He!!0

Output

1

Explanation

The given password P already contains one digit, one lowercase character, one uppercase character and one special character. However, it should also contain at least 6 characters. So we need to add 1 character to ensure it meets all the criteria.

Longest Prefix Suffix

Given a string, compute the length of the longest proper prefix which is same as the suffix of the given string.

Input Format

The input contains a string S, consisting of only lowercase characters.

Output Format

Print the length of the longest proper prefix which is the same as a suffix of the given string.

Constraints

$1 \leq \text{len}(S) \leq 100$

Example

Input

smartintsmart

Output

5

Explanation

Self Explanatory

Time of the Year

Given the number of seconds elapsed since epoch [01-01-1970 00:00:00 Thursday], you need to find the current date, along with the day.

Note: Do not use any inbuilt functions/libraries for your main logic.

Input Format

First line of input contains T - number of test cases. Its followed by T lines, each line contains the number of seconds elapsed since epoch.

Constraints

$1 \leq T \leq 10000$

$0 \leq S \leq 109$

Output Format

For each test case, print the date in DD-MMM-YYYY format, followed by the day, separated by newline.

Sample Input 0

10

86399

86400

2592000

2678400

8639999

8640000

31535999

31536000

68169599

68169600

Sample Output 0

01-JAN-1970 Thursday

02-JAN-1970 Friday

31-JAN-1970 Saturday

01-FEB-1970 Sunday

10-APR-1970 Friday

11-APR-1970 Saturday

31-DEC-1970 Thursday

01-JAN-1971 Friday

28-FEB-1972 Monday

29-FEB-1972 Tuesday

Explanation 0

Self Explanatory

Long Pressed Keys

Observing your friend as they type their name on the keyboard, you notice that occasionally a key might be held down longer, causing a character to appear multiple times. After examining the sequence of typed characters, determine whether it's possible that the typed sequence corresponds to your friend's name. Print true if typed_name corresponds to your friend_name, otherwise print false.

Input Format

The first and only line of input contains two strings separated by space.

Output Format

Print true if typed_name corresponds to your friend_name, otherwise print false.

Constraints

$1 \leq \text{len}(\text{friend_name}), \text{len}(\text{typed_name}) \leq 1000$

Example

Input

raju rrraaaajjjjjjjjjjjjjuuuu

Output

true

Explanation

Self Explanatory

Check if All Characters Have Equal Number of Occurrences

Given a string s, return true if s is a good string, or false otherwise.

A string s is good if all the characters that appear in s have the same number of occurrences (i.e., the same frequency).

Example 1:

Input: s = "abacbc"

Output: true

Explanation: The characters that appear in s are 'a', 'b', and 'c'. All characters occur 2 times in s.

Example 2:

Input: s = "aaabb"

Output: false

Explanation: The characters that appear in s are 'a' and 'b'.

'a' occurs 3 times while 'b' occurs 2 times, which is not the same number of times.

Constraints:

- $1 \leq \text{s.length} \leq 1000$
- s consists of lowercase English letters.

Printing Balanced Paranthesis

Write a program to generate all possible strings with balanced parentheses having N pairs of curly braces.

Input Format

First line of input contains T - number of test cases. Its followed by T lines, each contains a single integer N.

Constraints

$1 \leq T \leq 12$

$1 \leq N \leq 12$

Output Format

For each test case, print each combinational pair of balanced paranthesis of length N in a lexicographical order along with the test case number, separated by newline.

Sample Input 0

2

3

2

Sample Output 0

Test Case #1:

{{}}

{}}

{}}

{{}}

{{}}

Test Case #2:

{{}}

{{}}

Explanation 0

Self Explanatory

Interleavings

Given 2 strings A and B, print all the interleavings of the 2 strings. An interleaved string of given two strings preserves the order of characters in individual strings and uses all the characters of both the strings. For simplicity, you can assume that the strings have unique characters.

Input Format

First line of input contains T - number of test cases. It is followed by T lines, each containing 2 space separated strings A and B.

Constraints

$1 \leq T \leq 100$

'a' <= A[i], B[i] <= 'z'

$1 \leq \text{len}(A), \text{len}(B) \leq 10$

Output Format

For each test case, print the test case number, followed by the interleavings of the 2 strings in a sorted order, separated by newline.

Sample Input 0

2

nkb gl

bn zh

Sample Output 0

Case #1:

glnkb

gnkbl

gnklb

gnlkb

ngkbl

ngklb

nglkb

nkbgl

nkgbl

nkgbl

Case #2:

bnzh

bzhn

bznh

zbhn

zbnh

zhbn

Explanation 0

Self Explanatory

Topic : Sorting:

Bubble Sort Adhoc

Implement Bubble Sort and print the total number of swaps involved to sort the array.

Input Format

First line of input contains T - number of test cases. Its followed by 2T lines. First line of each test case contains N - size of the array. The next line contains N integers - elements of the array.

Constraints

$1 \leq T \leq 100$

$1 \leq N \leq 100$

$-1000 \leq ar[i] \leq 1000$

Output Format

For each test case, print the total number of swaps, separated by new line.

Sample Input 0

4

8

176 -272 -272 -45 269 -327 -945 176

2

-274 161

7

274 204 -161 481 -606 -767 -351

2

154 -109

Sample Output 0

15

0

16

1

Explanation 0

Self Explanatory

Selection Sort Adhoc

Implement Selection Sort and print the index which gets swapped at each step.

Input Format

First line of input contains T - number of test cases. Its followed by 2T lines. First line of each test case contains N - size of the array. The next line contains N integers - elements of the array.

Constraints

$1 \leq T \leq 100$

$2 \leq N \leq 100$

$-1000 \leq ar[i] \leq 1000$

Output Format

For each test case, print the index which gets swapped at each step, separated by space.

Separate the output of different tests by newline.

Sample Input 0

6

8

176 -272 -272 -45 269 -327 -945 176

2

-274 161

7

274 204 -161 481 -606 -767 -351

2

154 -109

4
5 3 1 5
4
40 10 20 40

Sample Output 0

4 0 4 3 1 2 1
1
3 0 1 2 2 1
0
0 0 1
0 0 0

Explanation 0

Self Explanatory

Insertion Sort Adhoc

Implement Insertion Sort and print the index at which the ith element gets inserted [$i \geq 1$].

Input Format

First line of input contains T - number of test cases. Its followed by 2T lines. First line of each test case contains N - size of the array. The next line contains N integers - elements of the array.

Constraints

$1 \leq T \leq 100$

$2 \leq N \leq 100$

$-1000 \leq ar[i] \leq 1000$

Output Format

For each test case, print the index at which the ith element gets inserted [$i \geq 1$], separated by space. Separate the output of different tests by newline.

Sample Input 0

4
8
176 -272 -272 -45 269 -327 -945 176
2
-274 161
7
274 204 -161 481 -606 -767 -351
2
154 -109

Sample Output 0

0 1 2 4 0 0 6

```
1
0 0 3 0 0 2
0
```

Explanation 0
Self Explanatory

Topic : Searching:

Linear Search

Given an array of integers, search a given key in the array using linear search.

Note: Do not use any inbuilt functions / libraries for your main logic.

Input Format

The first line of input contains two integers N and K. N is the size of the array and K is the key. The second line contains the elements of the array.

Output Format

If the key is found, print the index of the array, otherwise print -1.

Constraints

$1 \leq N \leq 10^2$

$0 \leq \text{ar}[i] \leq 10^9$

Example

Input

```
5 15
-2 -19 8 15 4
```

Output

```
3
```

Explanation

Self Explanatory

Sqrt(x)

Given a non-negative integer x, return the square root of x rounded down to the nearest integer.

The returned integer should be non-negative as well.

You must not use any built-in exponent function or operator.

- For example, do not use `pow(x, 0.5)` in c++ or `x ** 0.5` in python.

Example 1:

Input: x = 4

Output: 2

Explanation: The square root of 4 is 2, so we return 2.

Example 2:

Input: $x = 8$

Output: 2

Explanation: The square root of 8 is 2.82842..., and since we round it down to the nearest integer, 2 is returned.

Constraints:

- $0 \leq x \leq 231 - 1$