JSS ACADEMY OF TECHNICAL EDUCATION, NOIDA

Presents

CODEMANIA 2015

Ques 1: 0-1 knapsack problem

Problem Statement

Mark and Jane are very happy after having their first kid. Their son is very fond of toys, so Mark wants to buy some. There are N different toys lying in front of him, tagged with their prices, but he has only $K. He wants to maximize the number of toys he buys with this money.

Now, you are Mark's best friend and have to help him buy as many toys as possible.

Input Format

The first line contains two integers, N and K, followed by a line containing N space separated integers indicating the products' prices.

Output Format

An integer that denotes maximum number of toys Mark can buy for his son.

Constraints

1<=N<=105

1<=K<=109

1<=price of any toy<=109

A toy can't be bought multiple times.

Sample Input

7 50

1 12 5 111 200 1000 10

Sample Output

4

Explanation

He can buy only 4 toys at most. These toys have the following prices: 1,12,5,10.

Ques 2: Very Cool Numbers

For a number X, let its "Coolness" be defined as the number of "101"s occurring in its binary representation. For example, the number 21 has Coolness 2, since its binary representation is 101012, and the string "101" occurs twice in this representation.

A number is defined as Very Cool if its Coolness is greater than or equal to K. Please, output the number of Very Cool integers between 1 and R.

Input:

The first line contains an integer T, the number of test cases.

The next T lines contains two space-separated integers, R and K.

Output:

Output T lines, the answer for each test case.

Constraints:

1<=T<=100

1<=R<=105

1<=K<=100

Sample Input

1

5 1

Sample Output

1

Ques 3: Game of Numbers

Game of numbers is a game where you are given two integers (X and Y), and you have to print the number of special numbers between X and Y both inclusive.

The property of a special numbers is as follows:

A special number is not divisible by any number of the form Z*Z where (Z>1).

Input:

T, the number of testcases. Each testcase consists of two space separated integers denoting X and Y.

Output: The required answer in one line for each testcase.

Constraints:

1 <= T <= 100

1 <= X,Y <= 10^9

0 <= |X-Y| <= 10^6

Sample Input

1

1 10

Sample Output

7

Ques 4: Auto Charge

One day I was going to GIP mall from JSS College. After reaching at my destination, auto driver said, “I have no change so please give me change”. And auto charge was R rupees.

I have some coins and you have to tell if I can give him R rupees or not.

Input:

First line contain T (no of test cases). Each test case contain 2 lines. First line contains two integers N (number of coins) and R. Next line contains N space separated integers denoting the value of coins.

Output:

If I can pay exact R rupees, print “YES” without quotes otherwise print NO.

Example:

Input:

1

5 6

3 5 8 2 1

Output:

YES

Explanation:

3+2+1=6 OR 5+1=6, so, YES

Ques 5: Food is important

After getting good marks in semester exam, my friend asked me for a party. And recently I read about a new dish. But recipe of this dish was for a big marriage celebration. And my friend are few. So I want to cook this recipe in least amount as possible without changing its taste.

If ratio between amounts of ingredients will change then taste will change too. As you know food is very important and no one wants to waste food.

So you have to find minimum amount of each ingredient for making least amount of dish.

Input:

First line contain T (number of test cases)

Each test case contains two lines. First line contain an integer N (number of ingredients). Next line contains N space separated integers denoting amounts of ingredients.

Output:

One line for each test containing N space separated integers denoting the minimum amount of each ingredient.

Constraints:

$1 <= T,N <= 500$

$1 <= a[i] <= 10^9$

Example:

Input:

1

5

2 54 522 698 456

Output:

1 27 261 349 228

Ques 6: Simple Division

You are given a very large number N (consisting of up to 30 digits) and K. Check whether N is a multiple of K or not.

Input:

First line contains an integer T denoting the number of test cases.

Each test case contain single line of two space separated integer N and K.

Output:

If N is a multiple of K, print “YES” otherwise print “NO”

Constraints:

$1 <= T <= 500$

$1 <= N <= 10^{30}$

$1 <= K <= 1000$

Example:

INPUT

2

154269853516 3

154256985218 2

Output:

NO

YES

Ques 7: Soldiers and Dynamite

After a very long war, our soldiers feel tired and do not want to fight till next one week. So they placed some dynamites in enemy territory. Each dynamite can kill two neighboring enemies.

You are given a string of two upper case characters, ‘E’, denoting the enemy and ‘D’ denoting the dynamite.

Your task is to find how many enemies can be killed by activating all the dynamites at the same time.

Input:

First line of input contains number of test cases T. Each test case contains a single string S which contains two type of characters 'D' and 'E'.

Output:

For each test case, print total number of enemies that can be killed.

Constraints:

1 <= T <= 500

1 <= |S| <= 10000

Example:

Input:

3

EDE

EEDEEDE

DEEEDEDEE

Output:

2

5

6

Ques 8: Lunch Boxes

Masao and Naini, both Shinchan friends, are playing "home-home". But wait, they both forgot to bring any lunch box. Being a good partner Naini cannot allow Masao to go office without luch box. So she asked Masao to buy some.

Naini has N food items to be packed in the lunch box and maximum weight each lunch box can hold is W units. Let the weight of N items be w_0, w_1, ..., w_(N-1) units and each item's weight lies between 1 and W (inclusive). Find the arrangement so that the number of lunch box required to pack all food items is minimised.

Let's say Masao bought K lunch box (b_0, b_1,..., b_(K-1)) for packing N items. For each i'th box in [0, K-1], print the indices of food items, j in [0, N-1], which is placed in it. Each food item must be placed in only one box.

Help Masao in finding K and respective placement of food items in these boxes.

Constraints
1 <= N <= 10^5 1 <= W <= 10^5 1 <= w_i <= W

Input
First line of input contains two space separated integers, N W, numbers of food items to be packed and maximum weight each lunch box can hold.
Next line contains N space separated integers, w_0, w_1...w_(N-1), weights of 0'th item, 1'st item, ..., (N-1)'th item.

Output
In first line print an integer, K, numbers of lunch box required for packing all the food items. Then print K lines. Each of these line represents the content of a box. Each of these lines contains a number M (1 <= M), number of food items to be placed in current box followed by M space separated indexes of food items.

Scoring
Maximum number of lunch box required is N. The score will be equal to (N - K) / N * [Score of problem]

Sample Input

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

Sample Output

```
4
3 0 1 5
1 3
1 2
1 4
```

Explanation

In the give sample input/output, Naini used 4 boxes. 1st box contains 3 items, w_0 = 1, w_1 = 2, w_5 = 3. 2nd box contains 1 item, w_3 = 3. Similarly 3rd and 4th box contains 1 item each, w_2 = 4 and w_4 = 5, respectively.

Score for Input #1: 66.67.

Similarly, consider the following example.

Sample Input #2: 6 6 1 2 4 3 5 3

Sample Output #2: 3 2 0 4 2 1 2 2 5 3

Score for Input #2: 100.00

Naini used 3 boxes. 1st box contains 2 items, w_0 = 1, w_4 = 5. 2nd box contains 2 items, w_1 = 2, w_2 = 4. 3rd box also contains 2 items, w_5 = 3, w_3 = 3.

Ques 9: Jim and the Orders

In Jim's Burger, n hungry burger fans are ordering burgers. The ith order is placed by the ith fan at ti time and it takes di time to procees. What is the order in which the fans will get their burgers?

Input Format

On the first line you will get n, the number of orders. Then n lines will follow. On the (i+1)th line, you will get ti and di separated by a single space.

Output Format

Print the order (as single space separated integers) in which the burger fans get their burgers. If two fans get the burger at the same time, then print the smallest numbered order first.(remember, the fans are numbered 1 to n).

Constraints

$1 \leq n \leq 103$

$1 \leq ti, di \leq 106$

Sample Input

3

1 3

2 3

3 3

Sample Output

1 2 3

Explanation

The first order is placed at time 1 and it takes 3 units of time to process, so the burger is sent to the customer at time 4. The 2nd and 3rd are similarly processed at time 5 and time 6. Hence the order 1 2 3.

Ques 10: Will you be my friend?

Max feels lonely after shifting to a new locality, as he does not have any friend there. So his parents bought him a new number from the Integers SuperMarket! Every child in the locality has bought a number from the same market.

He takes the number to go play with other children in the locality. But to his surprise, there is a rule in the locality, two people A and B can only be considered friends if numbers with A and B are not Coprime, i.e they have a common factor other than 1.

You are given the number that Max bought and the numbers of other children in the locality. Can you find how many friends he can have?

Input:

First line contains an integer A, the number that Max has.

Second line contains N, the count of children in the locality.

Third line contains N space-separated integers, where Xi is the integer with the ith child.

Output:

Output the maximum number of friends that Max can make.

Constraints:

$1 \leq A \leq 103$

$1 \leq N \leq 103$

$1 \leq Xi \leq 103$

Sample Input

6

3

4 7 12

Sample Output

2

Explanation

Puchi can become friends with First and Third child.