

Problem Practice and misc. topics

Lesson #3 - 09/25/2025

TCHS Programming Team

Setup

If you haven't, create a codeforces account at

<https://codeforces.com>

Once you have an account join the group by using the following url:

Also open the compiler to write code:

<https://ide.usaco.guide>

The pdf for lessons will also be available here:

Lesson 2 Practice Problems

Addiply

Problem

Given two numbers, a and b , print $a + b$ and $a * b$.

Input

There is one line of input, where two numbers a and b ($1 \leq a, b \leq 10^4$) are given.

Output

Output $a + b$ and $a * b$ separated by a space.

Addiply (Solution)

Perform the addition and multiplication as stated in the problem

Addiply (Multiple Testcases)

Problem

Given two numbers, a and b , print $a + b$ and $a * b$.

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \leq t \leq 10^4$). t -lines follow, where each line represents each test case.

Each test case contains 2 numbers a and b ($1 \leq a, b \leq 10^4$) are given.

Output

For each test case, output $a + b$ and $a * b$ separated by a space.

Addiply (Multiple Testcases)

Problem

Given two numbers, a and b , print $a + b$ and $a * b$.

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \leq t \leq 10^4$). t -lines follow, where each line represents each test case.

Each test case contains 2 numbers a and b ($1 \leq a, b \leq 10^4$) are given.

Output

For each test case, output $a + b$ and $a * b$ separated by a space.

Addipty (Solution)

Perform the addition and multiplication as stated in the problem, but also do so for each test case

Addiply (Solution)

Perform the addition and multiplication as stated in the problem

Minimize!

Problem

You are given two integers a and b ($a \leq b$). Over all possible integer values of c ($a \leq c \leq b$), find the minimum value of $(c - a) + (b - c)$.

Input

The first line contains t ($1 \leq t \leq 55$) — the number of test cases.

Each test case contains two integers a and b ($1 \leq a \leq b \leq 10$).

Output

For each test case, output the minimum possible value of $(c - a) + (b - c)$ on a new line.

Minimize! (Solution)

Through simple manipulation we can see that:

$$(c - a) + (b - c)$$

$$c - a + b - c$$

$$-a + b$$

$$b - a$$

meaning that the value of c doesn't affect the final result in any way!

This just means the answer is $b - a$.

List Conundrum

Problem

Given two lists, a and b , print the number of even pairs.

Even pairs occur when at some index i , both a_i and b_i are even.

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \leq t \leq 10^4$). t -lines follow, where each line represents each test case.

Each test case starts with a single integer n ($1 \leq n \leq 10^4$), which denotes the length of both lists. The next line contains the lists a , and then line after that contains the list b .

Output

output the result.

List Conundrum! (Solution)

The hardest part about this problem is getting the input

To figure out if a number is even or not, we can use the logic:

```
if(num % 2 == 0){  
    // number is even  
}else{  
    // number is odd  
}
```

Practice Contest 1

Water Pressure

Problem

Let us assume that water pressure depends only on depth and is $\frac{x}{100}$ megapascal at a depth of x meters.

What is the water pressure in megapascals at a depth of D meters?

Input

Each test contains one integer, D ($1 \leq D \leq 10000$).

Output

Print the answer. Your output will be considered correct when its absolute or relative error from our answer is at most 10^{-4} .

Water Pressure (solution)

Get the number, then cast it to double and perform the operation

Important: you have to cast the number *before* performing the division, otherwise it will perform integer division and give a wrong answer.

Brick

Problem

We have a truck, which can carry at most N kilograms.

We will load bricks onto this truck, each of which weighs W kilograms. At most how many bricks can be loaded?

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \leq t \leq 2 * 10^5$). t -lines follow, where each line represents each test case.

Each test case includes two integers N and W ($1 \leq N, W \leq 1000$), representing the number of kilograms the truck can carry and the weight of each brick in kilograms, respectively.

Brick (ii)

Output

For each test case print an integer representing the maximum number of bricks that can be loaded onto the truck.

Brick (solution)

We can see that the solution is equal to the *floor* of the division, which is also equal to integer division.

Mandelbrot

Problem

...

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \leq t \leq 2 * 10^5$). t -lines follow, where each line represents each test case.

Each test case contains 3 integers z, c, r ($1 \leq z \leq 10^9, 1 \leq c \leq 10^9, 0 \leq r \leq 10^9$), representing the starting z value, the c value and the number of iterations, respectively.

Output

For each test case, output one integer z_r representing, the value of z after r iterations.

It is guaranteed that z_r over all test cases will be smaller than 10^{18} .

Brick (solution)

The problem is actually quite simple despite the long description. This is because the problem only gives integers, not complex numbers or any other math nonsense.

It is also guaranteed that the input fits within 10^{18} , so we can simply simulate the problem!

Foster's Nerds

Problem

...

Input

...

Output

For each test case, output a single integer: the total number of Nerds Mr. Foster receives.

Foster's Nerds (Solution)

We can simulate the different bags with simple logic.

The hardest part of the problem is separating the integer from the character:

- One option is take it as a string, then try and get the number and character from the string, or
- just use `cin` to take in the character and number separately