DIU Take-Off Programming Contest
Fall 202
[Main Round]

Organized By

Problem Analysis

Platform Support

Toph

Judging Panel

Judging Director

Riadh Hasan

9th Semester

Department of CSE

Daffodil International University

Judges

Tanima Hossain	**Md. Erfanul Islam**	**Rahat Islam Srijon**	**Abu Saleh**
12th Semester	12th Semester	9th Semester	8th Semester

Index

Problem Name	Setter Name	Reviewer
A. Greatest of All Time	Riadh Hasan	Tanima Hossain
B. Easy Squid	MD. Alif Babu	Galib Hossain
C. Survival of RLGL	Farjana Akter	Mohammad Dipu Sultan
D. Watch Your Steps !!	Umme Rukaya Suny	Rana Hossain
E. Inception	Nazmus Sakib	Riadh Hasan
F. The Farewell Souvenir 🎁	Tanima Hossain	MD. Albin Hossain
G. Green Light - Red Light	Ahmed Abdullah Shourav	Md. Erfanul Islam
H. Conjuring 96: Ms. Kiana and the Ghost	Shah Habibul Imran	Abu Saleh
I. The Game of Grid	M. Nusrat Ullah	Rahat Islam Srijon
J. Every Problem Solver Ever!	Md. Erfanul Islam	Tanima Hossain, Riadh Hasan

A. Greatest of All Time

Category: Give away (Data structure)

Problem Setter: Riadh Hasan
Reviewer: Tanima Hossain
Special Thanks: Ahmed Abdullah Shourav
Analysis:

```c
#include <stdio.h>
int main(){
    printf("Fate is like a game where winning depends on your performance.\n");
    return 0;
}
```

B. Easy Squid

Category: if-else

Problem Setter: MD. Alif Babu
Reviewer: Galib Hossain
Analysis:

If the given Demetris amount(T) is **greater or equal to 567**(T>=567) then print "Demetris is eligible for this game!", else (T<567) print "Better luck next time!".

C. Survival of RLGL

Category: Math + If else

Problem Setter: Farjana Akter
Reviewer: Mohammad Dipu Sultan
Analysis:

In this problem you have to tell if Gi-hun can cross the remaining distance. As Gi-hun crosses X distance from the starting line, he has to cross the remaining distance which is diff=D-X where D is the total distance from the starting line. With the acceleration a and time t Gi-hun can cross s=ut+1/2a*t^2 distance. As Gi-hun starts running from a static position so the value of u is 0. So the value of ut is 0. You have to calculate the value of ½*a*t^2. The value of a and t is given and you have to calculate the value of s=½*a*t^2. If the value of s is greater than diff then you have to print "Allah bachaise"(without Quote) otherwise you have to print "Moira gesi,Keu nara dis na!!!"(Without Quote).

D. Watch Your Steps !!

Category: If else (Hard)

Problem Setter: Umme Rukaya Suny
Reviewer: Rana Hossain
Special Thanks:

Analysis:

As in the 1st hop Il-Nam can cross X glass steps and reach at Xth glass step, in the 2nd hop he can cross Y glass steps and reach at (X+Y)th glass step, and in the 3rd hop at (X+Y+Z)th glass step. The non-durable glass steps can be only C^1th, C^2th, and C^3th. So if he steps into any of these 3 non-durable glass steps after the 1st hop then he will be eliminated on 1st hop, if he steps into after the 2nd hop then he will be eliminated on 2nd hop and if he steps into after the 3rd hop or couldn't manage to cross the Nth glass step even after the 3rd hop then he will be eliminated on 3rd hop. Otherwise, he is safe.

You just have to compare the positions after each hop (X, X+Y, and X+Y+Z) with the non-durable glass steps' positions (C1, C2, and C3), and if matches with the corresponding hop then print Eliminated on that hop. Also, check if his position after 3rd hop is equal to (N+1) or not, if not then print Eliminated on 3rd hop else print Safe.

E. Inception

Category: Loop

Problem Setter: Nazmus Sakib
Reviewer: Riadh Hasan
Analysis:

In our N number if we find x first time we enter in the x no dream but if we find it second time we exit the x no dream. And this cycle continue. From this we can understand in every odd time we find a same number we enter in a dream. So now we pic a number a[i] for the array where i=1,2,3,4,....n-1 then we find how many time a[i] by picking a number a[j] where j=i, i+1,i+2......,n. Than for ever odd count we will increase our answer

F. The Farewell Souvenir 🎁

Category: String

Problem Setter: Tanima Hossain
Reviewer: MD. Albin Hossain
Analysis:

As we know there are some letters that don't stay a valid letter after rotation. So, first we should check if the string contains any such letters. If it does, it can't be an ambigram, so we can print NO and move onto the next string.
If all the letters are valid then we will have to rotate the string and check if it still stays the same as the input. To do that, we can copy the string to another string which we will rotate and check if that is the same as the one in the input.
After copying the string, we should replace the letters of this copied string with the letters which they will become when we will rotate them. After replacing the letters, we will have to reverse it because as we can see in the problem statement if we rotate

a string 180degrees the first letter of the string becomes the last one, the 2nd letter becomes the 2nd last one and so on. So basically the whole string gets reversed. After reversing the string we should check if the new string matches the string in the input. If it does we can say it is an ambigram and print "YES". If not then we will print "NO".

G. Green Light - Red Light

Category: Adhoc

Problem Setter: Ahmed Abdullah Shourav
Reviewer: Erfanul Islam
Analysis:

This is a straightforward loop problem.
The number of players who did not move in the red light would have to be output. It's important to note that if the difference between the start and finish times of a player's movement is smaller than 1, the movement won't be detected.A straightforward solution is to loop from S to E and verify whether the red light was on or off at that time for each of these integers. If the red light was not on in any of these moments in the loop, the player is the winner. Similarly, we shall determine whether or not each student is a winner. And will take a count of the winners and finally print that.

H. Conjuring 96: Ms. Kiana and the Ghost

Category: implementation

Problem Setter: **Md. Shah Habibul Imran**
Reviewer: Abu Saleh
Analysis:

This problem is a simple implementation problem, but with a little bit from the number theory.

For each number, count its divisors. Since the maximum number can be $2*10^6$, the number with the highest number of divisors has no more than 200 divisors.

We'll keep an array a with 200 elements, for each index i, a[i] denotes the count of numbers with divisor count i.Initially the all indexes of the array will contain 0

For each number, we count its number of divisors, let's denote the number of divisors of **x** as **f(x)** , we'll increase **a[f(x)]** by one. So, after we count divisors for each number, we can easily run a loop from 200 to 1 to see which divisor count has the maximum numbers. The time complexity of this approach is **O(n*m*x)**, since for each number we need to find the number of divisors it has, and this will cost us **O(x)** If you observe the properties of divisors, you'll know that divisors form in pairs. If a number **x** is divisible by **p**, then **x** is also divisible by **x/p**. Thus we don't need to count divisors until x, you can count it by looping till x. You can learn more about this approach here: https://codeforces.com/blog/entry/22317

Time complexity:O(T*n*m*number on a room).

I. The Game of Grid

Category: Number theory

Problem Setter: MD. Nusrat Ullah
Reviewer: Rahat Islam Srijon
Analysis:

You will be given an integer. You have to output the minimum distance to that number from the multiplication table
Now the numbers in the multiplication table are constructed by multiplying the row number and the column number. So, every number in the multiplication table can be expressed as the result of multiplication of two numbers.
When we find divisors, we can check in pairs of i and n/i and till sqrt(n). As the moves can be only to the left and to the down cell, it can be deemed similar to Manhattan distance. To find the least distance we have to find the divisor pair whose multiplication result is n and sum of which is the minimum relatively.

J. Behold! The Stopper!!!

Category: Stopper

Problem Setter: Md. Erfanul Islam
Reviewer: Tanima Hossain, Riadh Hasan
Analysis: