

## Competitive Programming Introduction

We are providing you with some samples with which to train yourselves in competitive programming on the Kattis online contest management system (CMS) that we will be using. Please find the following three helps: 1) The included PDF of a high school contest that was previously used at a Nebraska school, 2) A Sample Contest (below) intended to illustrate how input/output are expected to be done, including solutions to the first problem in several languages, and 3) Selected problems already resident on the online CMS and presented as a practice contest that will be similar to your actual contest. Here is some guidance on how to best use these for your students' preparation:

- The old contest: The provided PDF offers a good sampling of problems and their associated challenges that you may expect in the actual contest. It would be helpful to work through them and discuss how solutions might be developed and tested.
- The practice contest: Use this online Kattis contest to make sure that your accounts work, and then that you become familiar with submitting code on the CMS. You can test your ability to code the input and output so that the online system will process the data correctly. There is a caveat to the selected problems: Most of them are written for college students, and as such may be more challenging than what we will present for the high school contest. You may get a "time limit exceeded" response on one of the test cases; if this happens and the difficulty rating of the problem is more than 1, do not let it bother you, as we will not be testing as strictly for time limits.

The sample contest begins on the next page.

## A – Double It

Your mission, should you accept it, is to double an integer. You will be given solutions in C++, C, Python, and Java. You are not limited to these languages, but this will illustrate how the input and output are to be handled. It would be good practice for you to enter solutions, print them, and run them.

### Input:

You are to take in one line of input which contains a single integer.

### Output:

Display the original integer and its double, formatted as in the sample below with single spaces.

### Sample Input:

```
4
25
-15
```

### Sample Output:

```
Double of 4 is 8
Double of 25 is 50
Double of -15 is -30
```

### Sample C++ Solution:

```
#include <iostream>
using namespace std;

// Sample C++ solution shows how to do I/O in the contest
// Task is to double the input number
// Compile on command line with "g++ Dubble.cpp -o Dubble.out"

int main() {

    // Note that there is no cout with a prompt for input

    int x;
    cin >> x;
    cout << "Double of " << x << " is " << 2*x << endl;

    return 0;
}
```

### Sample C Solution:

```
#include<stdio.h>

// Sample C solution shows how to do I/O in the contest
// Task is to double the input number
// Compile on command line with "gcc Dubble.c -o Dubble.out"

int main() {

    // Note that there is no printf with a prompt for input

    int x;
    scanf("%d", &x);
    printf("Double of %d is %d\n", x, 2*x);
    return 0;
}
```

### Sample Python Solution:

```
# Sample Python solution shows how to do I/O in the contest
# Task is to double an input number
# Interpret from command line with "python3 Dubble.py"

# Note there is no print to prompt for input

x = eval(input())
print("Double of {0:1d} is {1:1d}".format(x, 2*x))
```

### Sample Java Solution:

```
import java.util.Scanner;

// Sample Java solution shows how to do I/O in the contest
// Task is to double an input number
// Compile on command line with "javac Dubble.java" and
// Run on command line with "java Dubble"

public class Dubble {

    public static void main(String[] args) {

        // Note that there is no println with a prompt for input

        int x;
        Scanner keyboard = new Scanner(System.in);
        x = keyboard.nextInt();
        System.out.println("Double of " + x + " is " + 2*x);
    }
}
```

## B – Summing Up

Your mission, should you accept it, is to add together all the integers within a given range. Examine the sample carefully, or you could be fooled. This problem illustrates how precisely problems may be worded and should be understood. In the real contest, you might not be given sample input that illustrates all possible cases!

### **Input:**

You are to take in one line of input which contains two integers, a and b, separated by some white space (e.g. spaces or tabs).

### **Output:**

Display the sum of all the integers that are strictly between a and b, formatted as in the sample below.

### **Sample Input:**

```
2 6  
3 4  
6 2
```

### **Sample Output:**

```
12  
0  
12
```

## C – It's a Fact!

Your mission, should you accept it, is to calculate the factorial of the input integer.

### Input:

You are to take in one line of input which contains a single integer.

### Output:

Display the factorial of the given integer, formatted as in the sample below. If the factorial does not exist, display the original integer.

### Sample Input:

4  
-3  
0

### Sample Output:

24  
-3  
1