# The problem statement

In this section, you can present the problem you met when programing (“WrongAnswer” after submitting but test passed; the loop does not stop, etc.). The only request in this section is to present the problem as clear as possible so that other students may get your point. You can use any techniques you like such as figures, tables, etc.

# The hint from TA

In this section, TA’s hint could be presented and you may also append your own opinion the possible causes of this problem.

This section is indeed optional, if you find the TA’s response is helpless.

# The method to detect the bug

A detailed method for the detection of bugs should be presented in a clear way in this section. The method(s) could be proposed by TA, or it could be come up with by yourself. The only request is to prove that it is exactly this bug that causes the problem you met. You can take advantage of figures, the print out result from “fprintf” or other methods you like, but you need to precise every step you test bugs, e.g. which variables you tested, how you tested them, etc.

# Your improvement or correction

A brief proposition about how to fix the bug. You need to pay attention not to present your fixed source code. Other methods such as pseudo-code, flowcharts are permitted.

# What does this process give to you

You may summarize this process, either the way you debug or some other inspiration from this problem. This section is optional.

# The following is an example:

## The problem statement

I deploy two integers a and b for addition operation, but the result seems confusing. I have tested in my own IDE(codeblocks) and passed the test of online judge, but it returns “WrongAnswer”.

## The hint from TA

TA tells me that it would be better to input various sets of numbers with diversity for testing. When there exists any agnostic error or abnormal output, print out both variables a and b and their addition result; verify the result manually.

From my own opinion, I thought it could be the problem of adding function in c language; otherwise, it might be the problem of the online judge system. I will verify it and tells TA, putting him to shame.

## The method to detect the bug

I thought that the best way to prove TA is wrong is to prove his method does not work. I thus test a lot of numbers. I found it works smoothly at the beginning. But I then notice for some specific inputs the program gives an abnormal feedback, for example, when a = 8000000000, b = 2000000000, a+b = 1410065408, but it means to be 10000000000.

Follow the method proposed by TA, I print out the variables “a”, “b”, as well as “a+b” as following:



We can find that a = -5899434592, which is abnormal and may cause the wrong addition result. Then I noticed that “a” is out of the range of an integer. Therefore, the bug is found.

## The improvement or correction

The correction is immediate: When modifying integer type to long integer type, the bug is fixed.

## What does this process give to me

When debugging, it would be better to test with various input, because we never know which potential bugs our program is risking.

We could first figure out some suspicious functions or variables; set some break points or to print out the intermediate result to verify our conjecture.