CS205 C/ C++ Programming - Lab Assignment Template

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Part 1 - Analysis

> In this part, you should present how you analyze the problem and list basic steps to show how the problem is solved.
>
> You can list libraries, techniques and algorithms you use in this program and even some mathematical equations.

> Example: Sum the square from 1 to N, N will be given from `stdin`.

The problem is to calculate $\sum_{i=1}^{N} i^2$, traditionally, we can use a loop to calculate item by item, but we can do that in an efficient way.

$$\sum_{i=1}^{N} i^2 = \frac{N(N+1)(2N+1)}{6}$$

Part 2 - Code

```c
#include <stdio.h>

int main(int argc, char const *argv[])
{
    long long n;
    scanf("%lld", &n);
    if(n <= 0)
    {
        fprintf(stderr, "N must larger than 0\n");
        return 1;
    }
    long long result = n * (n + 1) * (2 * n + 1) / 6;
    printf("%lld\n", result);
    return 0;
}
```

Part 3 - Result & Verification

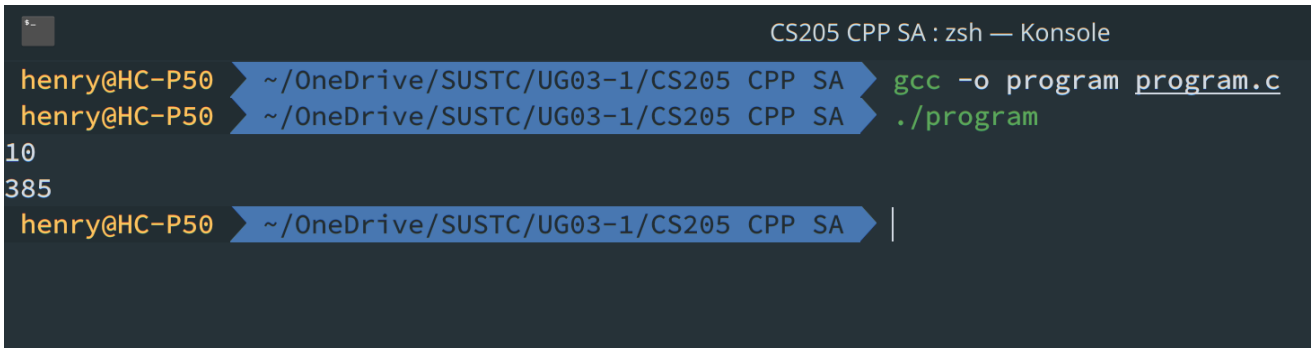
> In this part, you should present the result of your program by listing the output of test cases and optionally add a screen-shot of the result.

Test case #1:

```
Input: -1
Output: N must larger than 0
```

Test case #2:

```
Input: 10
Output: 385
```



Part 4 - Difficulties & Solutions

Using an `int` to store the result may sometimes cause an overflow, so `long long` is used.