

Data Structures and Algorithms

Homework 01¹

Note: You are required to submit your answer in *hand-written* form at the beginning of the next lecture.

Question 1.

What does the following code do?

```
int** a;  
a = new int*[m];  
for (int i = 0; i < m; i++)  
    a[i] = new int[n];  
for (int i = 0; i < m; i++)  
    for (int j = 0; j < n; j++)  
        cin >> a[i][j];
```

Question 2.

Consider the following program. What are values of variables value1 and value2 after executing the program?

```
#include <iostream>  
int main () {  
    int value1 = 0, value2 = 1;  
    int *p1, *p2;  
    p1 = &value1;  
    p2 = &value2;  
    *p1 = 10;  
    *p2 = *p1;  
    p1 = p2;  
    *p1 = 20;  
    return 0;  
}
```

Question 3 (optional).

Define Complex class for representing complex numbers. A complex number is of the form $a + ib$, where a and b are real numbers, and i is the standard imaginary unit with the property $i^2 = -1$. Followings are standard operators on complex numbers:

$$(a + ib) + (c + id) = (a + c) + i(b + d)$$
$$(a + ib) - (c + id) = (a - c) + i(b - d)$$
$$(a + ib) * (c + id) = (ac - bd) + i(bc + ad)$$

Write member functions of Complex class for the above mentioned operators.

¹ Adapted from Pham Bao Son's DSA-09s2