

SWE2016-44 Algorithms**Homework #2 (Due: October 17, 2019)***Professor: Joon Hee Choi**TA: Junsung Cho***Problem 1** Coding Assignment. Hash Table (30 pts)

Given an array of n integers and a number k , print out all pairs of elements in the array that sums to exactly k . For example, given the array $[1, 2, 3, 6, 7]$ and $k = 8$, you should print 1, 7 and 2, 6 out.

- Submit your source code for solving the following question via **icampus**. Use C, C++, Java or Python. DO **NOT** copy other codes.
- You should use **HASHING** and work in **$O(n)$** time.
- The input array size will be dynamic.
- If there is no pairs, do not print anything out.
- Your main function should include the codes reading four input files “hw2_input1.txt”, “hw2_input2.txt”, “hw2_input3.txt” and “hw2_input4.txt”, and writing four output files “hw2_output1.txt”, “hw2_output2.txt”, “hw2_output3.txt” and “hw2_output4.txt”, respectively. Only “hw2_output1.txt” will be provided.

Problem 2 Coding Assignment. Binary Search Tree (70 pts)

Write the following functions:

- (a) PrintPreorder(root)
- (b) Insert(n, root)
- (c) Delete(n, root) \leftarrow Use Inorder Successor
- (d) Balance(root) \leftarrow Convert a normal BST to a balanced BST
- (e) root = Merge(root1, root2) \leftarrow Merge two balanced BSTs and return a new root.

Your main function should include the following lines (modify the lines for your selected programming language):

```
Insert(30, root1); Insert(20, root1); Insert(50, root1);
Insert(10, root1); Insert(80, root1); Insert(40, root1);
Insert(70, root1);
PrintPreorder(root1);
Delete(70, root1); Delete(20, root1); Delete(50, root1);
PrintPreorder(root1);
Insert(70, root1); Insert(20, root1);
PrintPreorder(root1);
Balance(root1);
PrintPreorder(root1);

Insert(50, root2); Insert(60, root2); Insert(90, root2);
PrintPreorder(root2);
Balance(root2);
PrintPreorder(root2);

root = Merge(root1, root2);
PrintPreorder(root);
```

- Submit your source code for solving the following question via **icampus**. Use C, C++, Java or Python. DO **NOT** copy other codes.